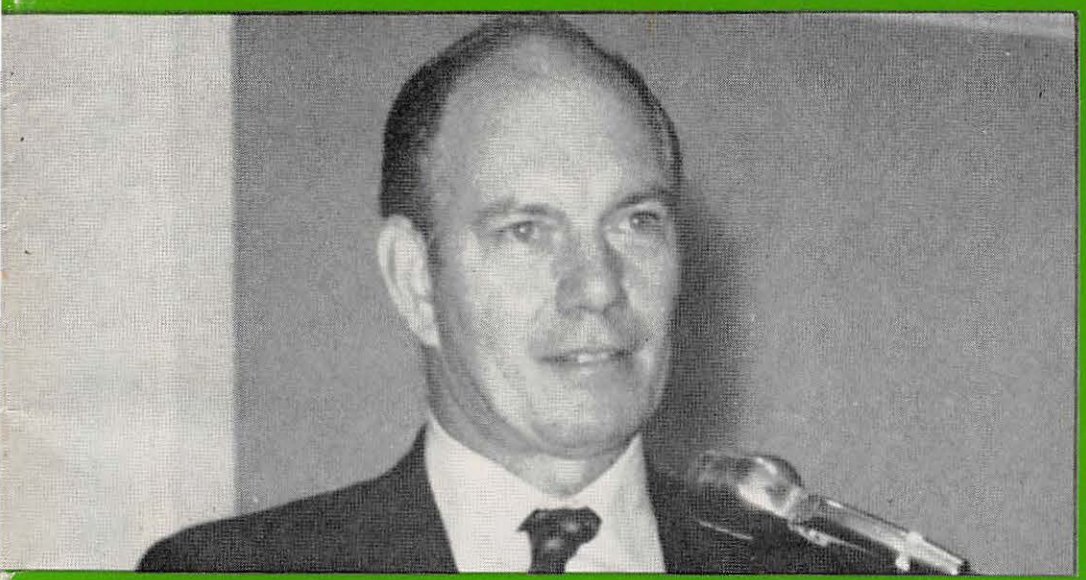
NOVEMBER 1971

rsc

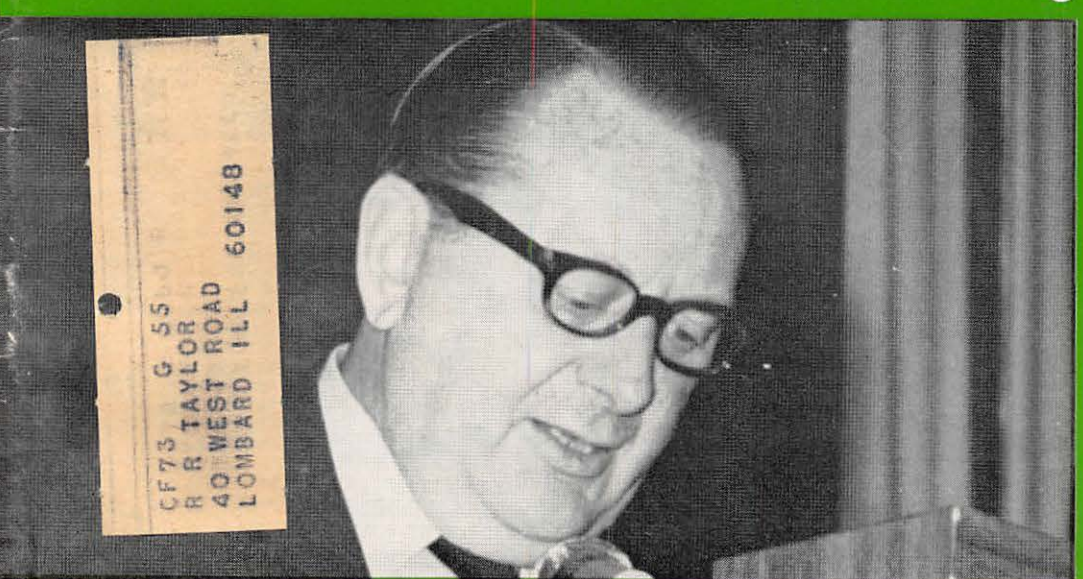
RAILWAY SYSTEM CONTROLS

Data Systems Division annual meeting



"We need to have a national freight car control and information system."
Alan S. Boyd, President, Illinois Central

C & S Section annual meeting



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"There is a greater need than ever before for close cooperation between railroads and the supply industry."
John W. Porter, Executive Vice-President, General Railway Signal Co.

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They're Tough! Designed to be seen and built to last without pamper or excessive care. Glass fibers and polyester resin provide tremendous strength and rigidity—unaffected by weather and atmosphere. Easy to install and connect. Hollow rectangular form provides a natural conduit for wiring. Standard AAR striping of black Scotchcal panels, or reflex-reflecting Scotchlite in customer specified colors is available . . . with reflector buttons or plates when desired.

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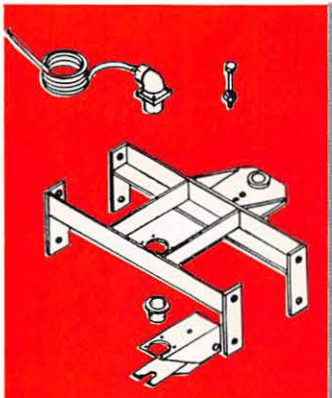

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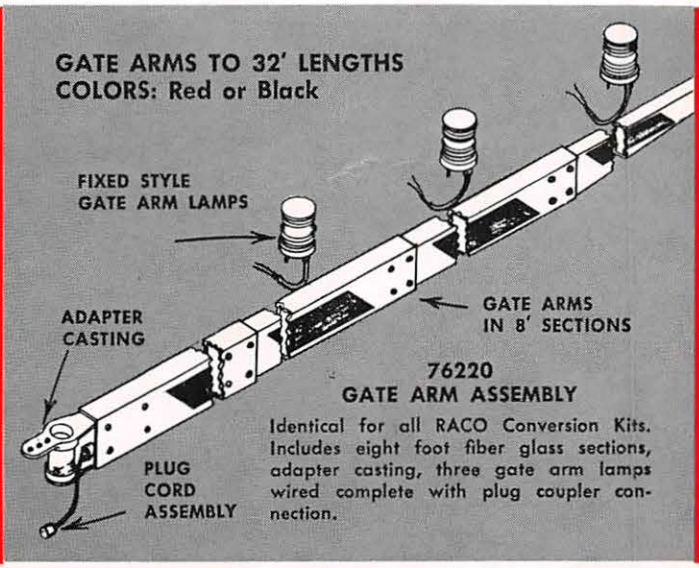
for converting wood arms to fiber glass on all pedestal mounted gates.



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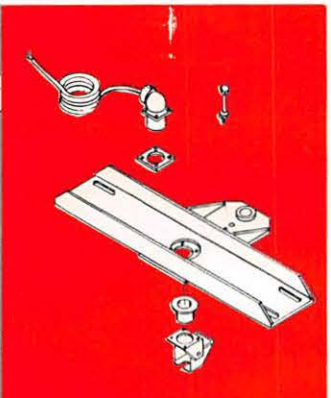

76227
CONVERSION BRACKET
for converting wood arms to fiber glass on all mast mounted gates.

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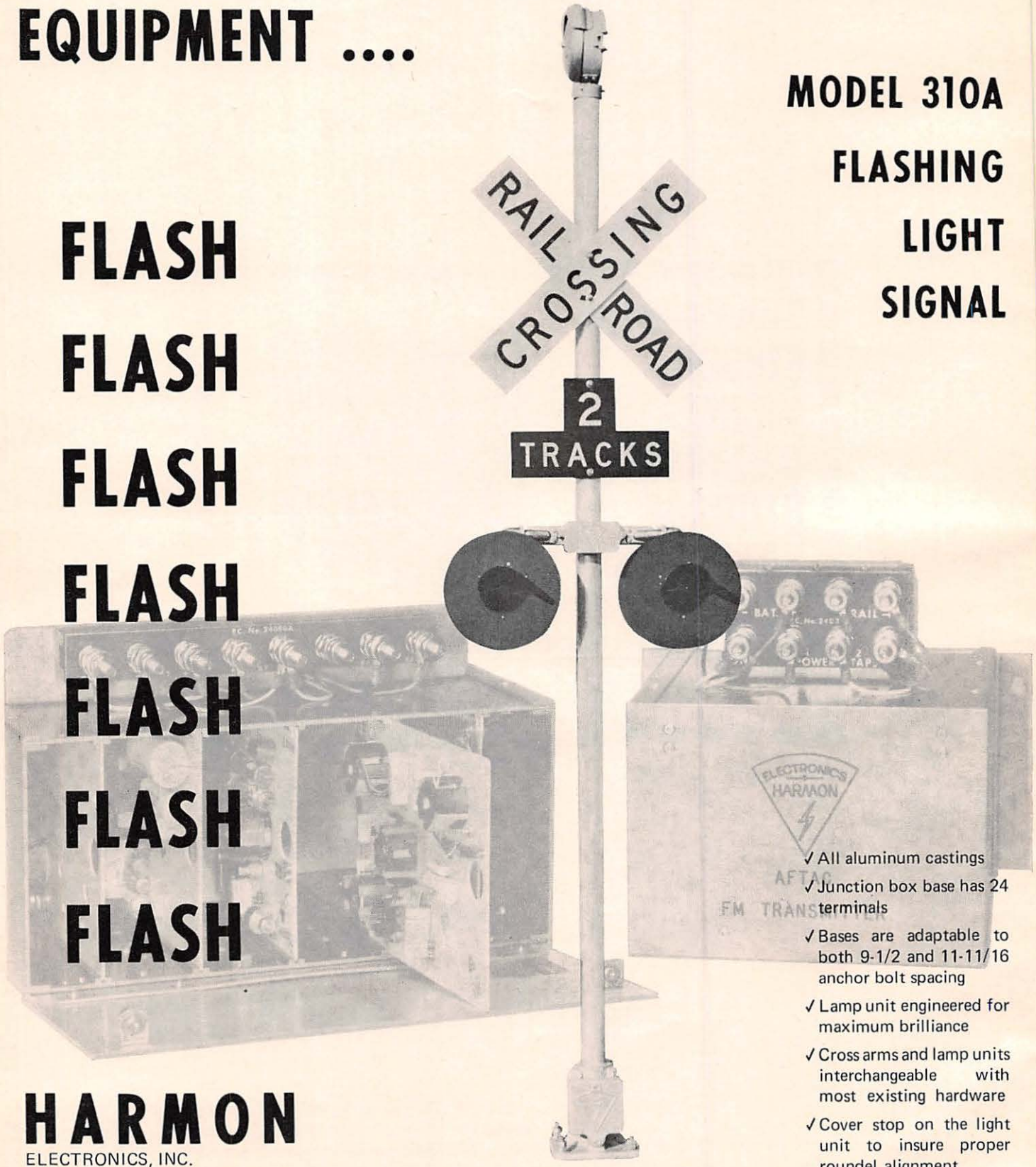

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NOVEMBER 1971 VOL. 2 NO. 11

RSC RAILWAY SYSTEM CONTROLS

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News Briefs

ACI Systems moves to Chicago area suburb

ACI Systems Corp. has moved from downtown Chicago to a new administrative and service facility at 520 Armory Drive, South Holland, Ill. 60473. The new headquarters provide room for national and regional sales forces, a class room and on-site training program facilities; the company's field engineering group; the laboratory and research staff and storeroom areas for scanners, related hardware, software and supplies.

BN extends ctc in Washington

General Railway Signal Co. has received an order from the Burlington Northern for equipment to extend centralized traffic control on the Wishram to Vancouver line from Wishram to Stevenson, an addition of 52 miles. Switches and signals at the 11 locations will be controlled from a Traffic Master console at Portland, Ore. Controls and indications will be transmitted via a type J code system.

BN orders data input systems

Burlington Northern has ordered three system 2100 key-disk-tape data input systems from General Computer Systems, Inc. of Dallas, Tex. The first system, a 29-terminal network will be used for payroll accounting with units located at St. Paul, Portland, Ore., Whitefish, Mont., Willmar, Minn., Omaha, Neb., and Chicago, Ill. A second 16-terminal system will be installed in Seattle for customer accounting and other in-house production. A third system with 18-keyboard terminals will be located in St. Paul and used for headquarters operations.

BN, HB&T, and PC upgrade signaling

General Railway Signal Co. is supplying equipment to modernize facilities on the Penn Central, Burlington Northern, and the Houston Belt & Terminal railroads. Two interlockings in New York City are being modernized by Penn Central. They will be controlled from a Traffic Master console at Lexington Ave. by system 4000, high-speed, solid-state code system. They are expected to be in service early in 1972. A turnout being installed by the Houston Belt & Terminal at Houston, is expected to be operative by the end of this year. At Missoula, Mont., Burlington Northern will add facilities to an existing GRS control console to control locations at Helena Junction, Garrison, and Garrison Wye. These are also expected to be in service by early 1972.

Cable Communications firm is renamed

CitCom Systems Inc. is the new name for Cable Communications Systems Inc. The U.S. affiliate of Compagnie Industrielle des Telecommunications CIT–ALCATEL of Paris, France, CitCom Systems is headquartered at 50 Rockefeller Plaza in New York City. CitCom Systems has the capability to engineer, fabricate and install complete communications systems utilizing coaxial cable systems, PCM equipment and multiplexing equipment as well as other communication products.

CTA plans for improvements

Chicago Transit Authority, in its $120 plus million capital investment program for 1972-73 is planning to spend an estimated $11,418,000 for cab signals on its north-south Howard Street to Jackson Park and Englewood route and also includes the Douglas branch from Cicero, Ill. to a connection near Racine Ave. on the Congress west line. Cab signal system will include track circuit controls as well as onboard signal equipment on 400 rapid transit cars.

FCC seeks tariff for telpak share

Federal Communications Commission, in line with a U.S. Court of Appeals decision in the telpak sharing case, has directed the telephone and telegraph common carriers to eliminate sharing discrimination in 30 days by filing tariff changes on 60 days' notice. Industry sources indicate that this means that the new telpak tariffs would normally become effective about the end of this year. However, there are possibilities of further court action or delays by the Commission.

According to *Telecommunications Reports* the FCC issued a statement, part of which concerns the Court of Appeals decision and is as follows:

"The court remanded the case to

(Please turn to page 18)

Servo is the world's leading producer of electronic hot box detector systems.

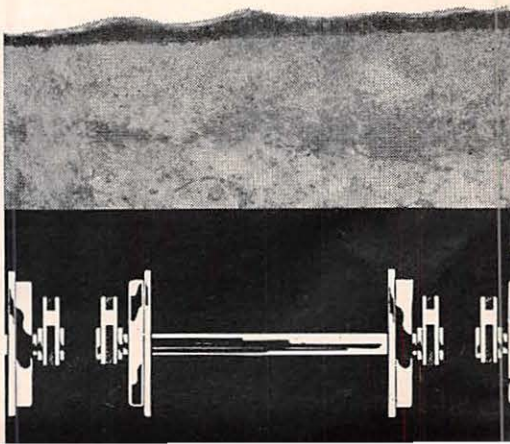
We're not experts in every phase of railroad safety — but as the industry's pioneer designer and producer of electronic hot box detection systems, we can claim a high level of successful experience in working on the problems of bearing failures, axle burn-offs and derailments associated with undetected hot boxes.

Since 1957, more than 1,600 SERVOSAFE Hot Box Detective Systems have been put into service by 54 of the world's major railroads, and have compiled an unequaled record of safety improvement, more efficient preventive maintenance procedures and cost reduction.

Hot box detectors available from Servo offer the widest flexibility in choice of system configuration, features and functional options, including: rail-mounted or ballast-mounted scanner; a complete selection of ancillary and test equipment; solid-state electronic signal processing. Several modes of data read-out are also available — automatic digital read-out at trackside or remote location; pen-paper recorder chart for visual interpretation; FM carrier data transmission over unlimited distances.

With our broad range of products and world-traveling network of field engineers, we can readily "customize" the design, manufacture, installation and operation of a SERVOSAFE system to best meet the particular requirements of your railway.

You are invited to contact us for complete descriptive literature, or to arrange a field engineering site survey and application review — without obligation, of course.



Circle 6 on reader service card

Hot box hide-n-seek. A dangerous game.

Hot box hide-n-seek is an old game — as old as railroading itself. And the villain in the game is the overheated journal that you can't find until it's too late — that's when it worsens into a really dangerous axle burn-off and costly derailment!

The safe way to beat the hot box at its own game is with a SERVOLARM® Model 8000 Trackside Hot Box Visual Display System. Designed to operate with any SERVOSAFE® Hot Box Detective™ System, the SERVOLARM visually signals the presence of a hot journal box and also pinpoints its location. SERVOLARM helps to eliminate train stops and crew delays. It simplifies and speeds up the entire hot box location procedure by directly notifying the crew via a trackside bi-directional display board — a digital readout shows the axle count location of the hot box. If there are no hot boxes, the display board reads "000."

SERVOLARM can be quickly and easily installed with a minimum of construction equipment and labor, while eliminating long distance wiring and extensive communication equipment costs.

If you're looking for an easier and safer way to win the game of hot box hide-n-seek most of the time, take a look at SERVOLARM.

Train crew on the Cincinnati-Atlanta line of the Louisville & Nashville Railroad gets the "OK" signal from a SERVOLARM Trackside Hot Box Visual Display.

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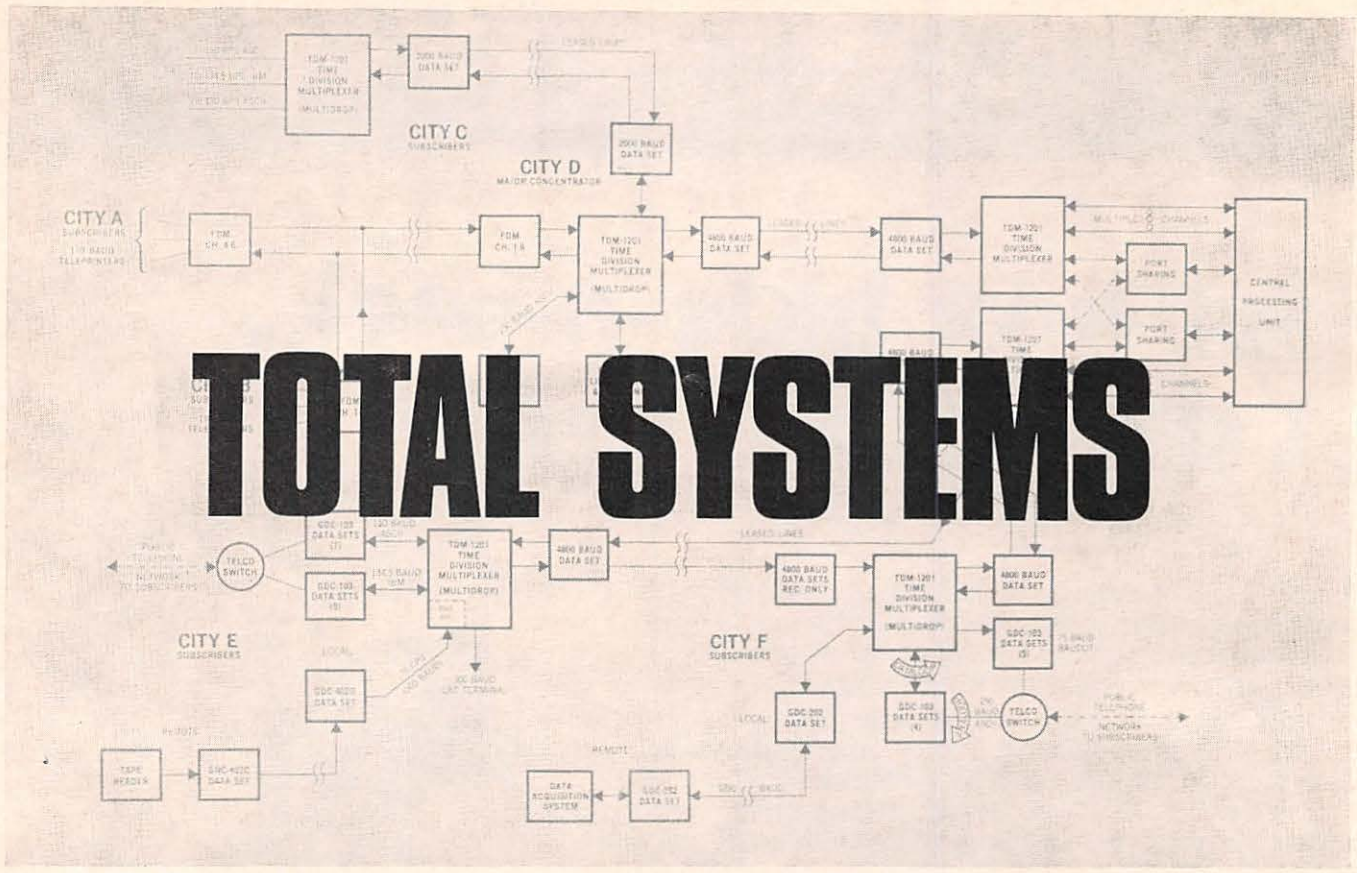

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Because we've been in the data communications business for a long, long, time — we think we've got a handle on what you, as the data communications manager, need to meet your requirements — SYSTEMS, PRODUCTS, SERVICE and LEASING.

- General DataComm, through a thorough knowledge of telephone services, combined with extensive experience in data systems design, is able to define data communications problems and develop the most productive and economical system to fulfill your needs.

- General DataComm products which include both time division and frequency division multiplexers, a wide range of modems, and other communications hardware have features that make them unique in the marketplace . . . such as integral Analoop™ and Data loop™ systems diagnostics that pay off in versatility, reliability, and ease of service.

- General DataComm has reduced cost to you by standardizing product. More than 60 different modem and multiplex models are produced with less than 700 components. This means, model flexibility, production line reliability and designed versatility.

- General DataComm's initial installation procedure includes alignment, operational check-out, and indoctrination of customer personnel. Field service is available from over 75 central service locations on an on-call basis — with maximum response time of four hours — or on an annual service arrangement.

- General DataComm has adapted to the computer marketing philosophy by making equipment optionally available to customers on a lease basis. This allows the user's decision to install a system to be an operating decision, without capital appropriation approvals.

- General DataComm is always seeking ways to improve the state-of-the-art, resulting in the consumer benefits of convenience and profitability.

Like the sound of this? For more information, drop a card to:

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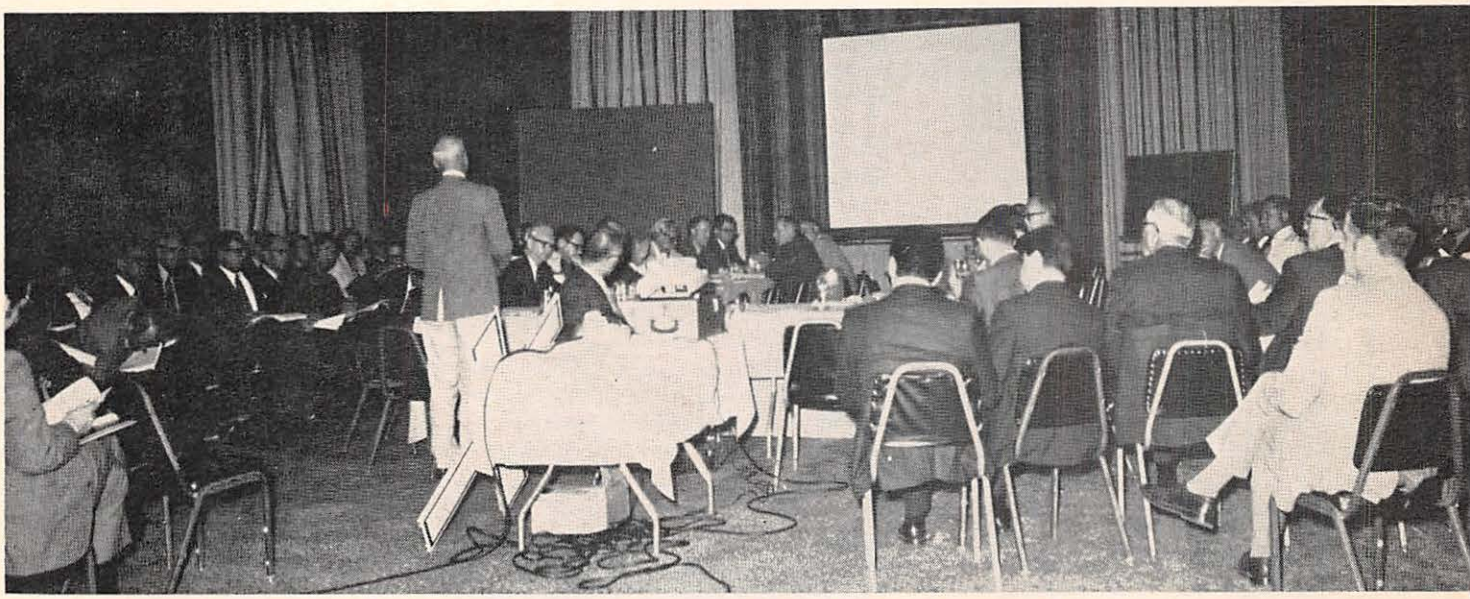

WORKSHOP ATTENDANCE REACHED 60-70 each at afternoon Communication & Signal Section session.

Info swapping key to C&S meet

Information exchange was the theme that linked all sessions of the 11th annual meeting of the Communication & Signal Section, AAR, at Bal Harbour, Fla. In contrast to previous meetings, there were five workshops and an address by the head of the suppliers organization. Noting that the C&S annual meeting afforded the opportunity for suppliers and their customers to become better acquainted through personal contact, this year's chairman and president, John W. Porter, then talked about the benefits of diversification. "Where we have been successful in diversifying, it has been to the benefit of you, our communications and railway signaling customers. Financially, we became stronger, more able to undertake research, production and product line improvements. Our broader product mix gave us the benefits of cross-fertilization—concepts and methods learned in other fields that we could adapt with benefit to the railway field."

"You can't just plug an off-the-shelf item into a railway communications or signaling system and expect it to perform the way it must perform to meet the exacting demands of our field of service—railroad service. A great deal of work, a great deal of engineering time, must often be expended in applying—in 'application engineering'—such 'off-the-shelf' products so that they will perform reliably and safely in railway systems service. Making such adaptations is in itself a form of research and development. This kind of system management, of technology, application engineering, and general know-how, might be identified as applied research rather than pure research; yet, it is basic to achieving practical, reliable systems.

"A tremendous amount of money is fed into research and development by our companies on behalf of the railroads," Porter said. He went on to point out that R&D costs embrace more than laboratory-type research. With the advent of DOT and particularly FRA and UMTA, there has been renewed interest in research, and particularly in railroads and mass transit. For example, DOT's Transportation Systems Center funded and reported on a study of *Technological Innovation in Grade Crossing Protective Systems.*

"What role shall we, the supply companies, and you, our customers, take in this movement? We must become a dy-

MANAGEMENT INFORMATION

The eleventh annual meeting of the Communication & Signal Section, AAR, provided a true information exchange for the engineers and managers in a highly specialized field where new solutions to old and new problems were presented. For example, new communications techniques such as 12 GHz microwave, coaxial cable systems and selective signaling equipment pointed toward solutions of the problem of providing higher capacity, error-free communications circuits. On the signal side papers were presented concerning improved crossing protection controls, safer track circuits and how to reduce inductive interference.

namic part of this movement, helping to shape it to the benefit of the North American railroads and the shipping public," said Porter, executive-vice president, General Railway Signal Co.

He then cited seven factors affecting the feasibility of supporting a position of taking a dynamic part in transportation R&D.

—"We, the supply companies, are going to continue to do research.

—"You can continue to help us in cooperating with our research efforts, especially in giving us the benefits of using your facilities—under carefully controlled conditions—as field laboratories, as practical, in-service testing grounds, rather than see taxpayers' money spent to build testing grounds.

—"We suppliers have a continuing investment of men, money and equipment regularly devoted to application engineering, to product adaptation and improvement.

—"You, the railroads, cannot always easily justify spending money for the kinds of research we the supply companies must do to keep our positions in our markets. So you partly rely on our efforts and profit by them.

—"The AAR offers railroads the economy of joint research, of cooperative effort for your mutual benefit.

—"If the federal government through the Department of Transportation, assumes sole leadership in railway research, you—and we—may well find ourselves tax funding projects that we consider of minor importance, at the neglect of some very vital areas.

—"Who shall say where research efforts—your money and ours—shall be invested? You, the railroads, together with us, the supply companies, constitute the only acceptable pool of practical experience to answer this question. Let's make our voices heard."

Mentioning that the railroads are going through trying times, Porter went on to say: "It is paramount that managers and engineers responsible for providing and supplying signal, safety, control and communications systems as service facilities to railroad operating management, recognize these needs for change. It is vital that they – meaning all of us—be able to advise and counsel management.

"There is today a greater need than ever before for close cooperation between railroads and the supply industry, with improving safety and services as our mutual objective," Porter said.

"There is a need for all of us to be forward looking, for greater exchange on immediate and future needs so that research and development expenditures may be given the required priority and so that our efforts will be ever more accurately directed toward your needs.

"There is a need to review present practices in systems management and in setting control and design criteria. Developments such as micro-electronic devices and the minicomputer demand this. We must—within our own areas of activity—re-examine our practices so we continue to keep in step with modern technology. We must be ever alert to evaluate the technologically novel, to see how we may use it in the light of our vast amount of past experience," Porter said.

In an effort to conserve travel time and expense, and make C&S Section committees more efficient, the various subcommittees are now formed on a regional basis. In this way subcommittee meetings can be more fully attended. R. R. Manion, vice-president, operations & maintenance, AAR, also announced the formation of three new committees to handle liaison activities with outside organizations. The radio liaison committee (chaired by L. R. Thomas, general superintendent communications and signals, Santa Fe) shall maintain liaison with the appropriate governmental agencies, review proposals with them (FCC, FRA, etc.) concerning railroad radio and working with the AAR staff, take necessary action on behalf of the railroads. J. R. DePriest, superintendent communications and signals, Seaboard Coast Line, is chairman of the signal liaison committee. This group has a charge similar to that of the radio liaison committee. The inductive interference committee will develop information relative to inductive interference, ground rise potential problems and other interference influences to communication and signal facilities from power lines and recommend interference standards to be used by the railroads. Headed by H. M. Robertson, assistant to superintendent of communications, Union Pacific, this group will cooperate with the Institute of Electrical and Electronic Engineers and the National Bureau of Standards and state and federal regulatory agencies concerned with the development of safety standards.

R. D. Liggett, SCL

"We should consider the minicomputer. It can perform exacting real-time control functions."

After commenting upon the C&S Section's long history (predecessors, Association of Railroad Telegraph Superintendents formed in 1882 and the Railway Signaling Club in 1895), chairman R. D. Liggett, said "our work is unique in that the specific field is not taught in schools or colleges in the conventional manner, and save for the records of this Section and its predecessors, is largely undocumented."*

"On top of disciplines and documentation, one additional asset of our past comes to mind that has been afforded to us by this organization, that is, the personal contact among members from all parts of the country. This is difficult to assess in dollars and cents, but is as important and as real as the others. The exchange of information, the comparison of notes, face to face by people working in the same industry is invaluable. It would be worth the cost to the industry to bring such people together from time to time if nothing else ensued except this personal contact," noted Liggett, chief engineer communications and signals, Seaboard Coast Line.

"Up to this point on railroads, the computer has largely been used in the area of accounting, bookkeeping, car

*Editors' Note: Signal and communications activities have been covered by *Railway System Controls* and its predecessors including *The Signal Engineer*, founded in June 1908.

Committees update communications and signal manuals.

COMMITTEE A—OUTSIDE PLANT FACILITIES. Specification for damping aerial cable approved for inclusion in the Communication Manual. Report on availability of low loss paired wire for use in lieu of twisted pair was accepted as information.

COMMITTEE B—RADIO AND MICROWAVE SYSTEMS. The following specifications were approved to supersede subject matter in the Communication Manual: Part 12-10- FM radiotelephone transmitting and receiving equipment and accessories; Part 12-11- Kind and amount of equipment desirable for maintenance of railroad radio and inductive carrier transmitters, receivers and associated equipment; Part 12-13- Pack or hand-carried FM radiotelephone trnsmitting and receiving equipment and accessories; and Part 12-26- Signal generator. Manual Parts 12-25 (tube tester) and 12-28 (long range control of hump or yard engine by inductive carrier) were approved for elimination from the Communication Manual. The following reports were accepted as information: Government activities affecting the status of railroads with respect to radio; Circulars pertaining to radio matters—C&S 323, 324, 326, 327, 328, 331, 335, 341 347-349, 352, 358, 360, 362, 364, 365; Statistics on railroad radio authorizations, installations and microwave point-to-point systems; activities and developments in connection with radio services of other organizations; and status of special power devices.

COMMITTEE C—COMMUNICATIONS AND DATA SYSTEMS. Manual Part M-2 (graphical symbols for plans showing telephone, telegraph, Teletype and radio equipment) and MP M-3 (graphical electrical symbols for architectural plans) were approved to supersede subject matter in the Communication Manual. Specification for frequency division multiplex system was approved for inclusion in the Communication Manual. The following manual parts were approved for elimination from the Communication Manual: 2-H-1, 2-H-4, 2-H-5, 2-J-14, 2-K-39, 2-K-40, 6-A-1 and 6-C-1. The following information reports were accepted: Recent developments in power supply equipment fuel cells; New battery; Signaling in frequency division multiplex systems; Techniques for expanding dispatchers' circuits on a 4-wire basis; Data modems introduced and modified 1970; and Requirements for interconnecting of private equipment with common carriers.

COMMITTEE D—HIGHWAY GRADE CROSSING PROTECTION. The following drawings and manal part were approved for elimination from the Signal Manual: 1488B, 1678B, 1690B, 1711A and MP 43. The following information reports were accepted: Methods to improve effectiveness of railroad-highway grade crossing protection devices; Time limits for installation of highway crossing facilities; Railway crossing sign symbol type; and Typical circuits 8052C addendum sheets 1 and 2 for control of automatic highway grade crossing signals.

COMMITTEE E—INTERLOCKING, TRAFFIC CONTROL AND BLOCK SIGNAL SYSTEMS. The following reports were accepted to supersede subject matter in the Signal Manual: Part 81- Requisites for minimizing the effect of lightning on track circuits; Part 196- Train shunt resistance test form 7003; Part 212- Specification for decoding unit, revised; Part 215- Specification for direct current code transmitter, revised; and Part 216- Specification for direct current code-following polar relay, revised. The following information reports were accepted: Performance of insulated rail joints; Methods for eliminating insulated joints in railroad tracks in connection with signal facilities; and Specific elements of train hour cost per road freight train hours, Class I railroads, 1969.

COMMITTEE F—CAR AND ENGINE CONTROL SYSTEMS. Two manual parts 177 (requisites for presence detectors, revised) and 285 (requisites for switching signal systems for use on engines in yard service, revised) were approved to supersede subject matter in the Signal Manual. Manual Part 282 on requisites for long range remote control of hump or yard engine by inductive carrier was approved for elimination from the Signal Manual. Information reports on dye marker and indication systems, and evaluation of hotbox detector usage were accepted as information.

COMMITTEE G—EDUCATION AND TRAINING. An information report on progress in the work of updating a training and development reference manual and development of the building block approach for signal training lessons was accepted.

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tracing, car utilization and information systems aimed at serving shippers. While C&S people have been involved to the extent of providing communications circuits for the data network, the area of computer management or real time operations for us generally has been limited to classification yards. It is now time when a greater avenue of rapport and exchange of information take place between these two vitally important AAR service organizations," Liggett said. Next year the C&S Section will meet Monday and Tuesday with a joint session on Wednesday with the Data Systems Division, which will have its own meeting continue on Thursday and Friday.

"New technology has brought the cost of computers down dramatically and the so-called minicomputer is an exciting tool for our consideration. It has the capability of performing exacting real time control functions for communication and signal processes along with the compatibility to buffer such functions with its larger counterpart managed by the data people," Liggett said.

"The 12 GHz frequency band provides a valuable segment of spectrum for the industrial users. It should be useful for short spur legs, unless the reliability requirement is extremely high," said R. F. White, senior staff engineer, GTE Lenkurt Inc. Users have shown

strong preference for the 2 GHz and 6 GHz bands because of "the much greater susceptibility of the 12 GHz band to attenuation due to rainfall. Although the effect is present to some degree at the lower frequencies, it increases very rapidly with frequency and a rainfall intensity causing only a few dB of attenuation at a lower frequency could well be sufficient to cause a path outage at 12 GHz.

"As more and more microwave systems come into existence there is growing frequency congestion, and in some areas," White said it is sometimes impossible to find interference free frequencies or paths in the 2 GHz and 6 GHz bands. Also, RF channels are licensable with 20 MHz of bandwidth in the 12 GHz band, compared to only 10 MHz at 6 GHz. The 500 MHz of spectrum space in the 12 GHz band is greater than the combined total of the two lower bands. And, noted White, the FCC "has sought to encourage use of the 12 GHz band for short spur legs of the longer systems, thus keeping the lower frequencies available for the backbone routes."

"Cable can be designed to operate successfully in the environment of railroad trackside. These cable designs are suitable for plowing along the trackside. Either a pulse code modulation (PCM) facility or a frequency division multiplex (FDM) facility could be used depending upon the users preference. This would obviously enable railroad companies to lease their right-of-way to communications and power utilities. It is usual that the maintenance of these systems can cost less than the maintenance of comparable microwave systems, and we believe that cable is a viable, economic alternative for trackside communications use," stated a paper delivered by Glen T. Fisher, director of research, Canadian Pacific Ltd.; L. D. Tufts, supervisor research engineering, CP Ltd.; R. J. Griffiths, manager communication cable design development, Bell Northern Research Corp.; and S. Chhura, staff engineer, Northern Electric Co. Ltd.

The trackside communications system studied consisted of two terminals 125 miles apart with intermediate terminals 25 miles apart where circuits are dropped for VHF radio base stations, hotbox detectors, etc code lines, etc. For FDM transmission would be over a small bore coaxial cable (proposed cable would have a core 4 x 0.174 inch diameter tubes). "FDM system terminals are very flexible. The system could be expanded a single channel at a time. The outside plant portion of the network can be enlarged in steps of 300 channels. This system will provide toll quality transmission for up to 1500 miles. The power required for the dependent repeaters is supplied over the coaxial tubes from the end terminals located 125 miles apart. Intermediate points, located every 25 miles or so, will normally require a dc power source for the local multiplex terminal.

"The present PCM equipment is designed to operate on regular paired conductors. The repeater spacing is approximately 2 miles for 19 gauge .083 mF/mile cable. Twenty-four channel PCM has been limited to 50 miles. There is no technical reason why an extension to 300 miles between decoding points is not feasible. PCM will need powering points every 25 miles which is extremely convenient for dropping/insertion facilities.

R. R. Manion, AAR

"Committees have been formed to work on inductive interference, radio matters, signal liaison."

"For our 125 mile model railroad the cost of a cable system, either PCM or FDM, would be between $9,000 and $10,000 per mile. Since both system costs are based upon 300 channel capacity, the costs per channel mile are comparable. Costs of plowing the cable in the ground will vary according to terrain and local labor costs," said Fisher, Tufts, Griffiths and Chhura. Cost for the 300-channel, 125-mile FDM system totaled $1,337,000 compared to $1,287,000 for a similar PCM system. Costs covered multiplex, bank, line and power equipment, engineering and installation, carrier and voice-frequency cables, and plowing in the cable.

"The 470 SS1A selective signaling private line assembly is a complete 4-wire, 2-digit, dial selection communication system. It employs both signaling and voice terminating circuitry. Frequency shift inband tone signaling and decoder logic provide individual 2-digit dial selection of up to 81 available station, group or broadcast codes," reported C. J. Stephens, sales manager, Wescom, Inc.

"This selective calling system has been installed on the Missouri-Kansas-Texas. The network extends from St. Louis through Jefferson City, Mo. to Parsons, Kan.; Tulsa, Muskogee, and Durant, Okla. and terminating in Dallas, Tex. Along this route are located over 40 terminals. At all locations, a dispatcher's phone is assigned an individual code. At some locations, other personnel are assigned different codes as well as dispatcher codes. Very simply, this means if a dispatcher code is dialed, all phones arranged for that code ring. Anyone answering the call trips the ringing.

"Since some of the locations are unattended at certain times, it was considered useful to be able to access the station and make connections to a remote microphone. This arrangement now allowed the calling party to hear and monitor the unattended station. A bell is also rung at the called station to verify acoustically the operation of the microphone. After a predetermined time interval, the bell is timed out and disconnected, leaving the microphone connected for continued monitoring. A dialed disconnect code releases the station when not in use," Stephens said.

The distributed computer concept consists of modules, each dedicated to a specific, clearly defined task. The system may be applied to new classification yards, and is equally adaptable for upgrading existing yards and terminals. "It provides a means for upgrading an older facility a function at a time, enabling the investment costs for a modernization program to be spread over a longer period," said Mark H. Sluis, vice-president engineering, General Railway Signal Co.

The basic design philosophy "is the application of a completely modular, plug-coupled, proprietary interface which is designed and built to work in

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conjunction with a minicomputer. Each minicomputer has provision for a plug-coupled teleprinter unit which is the primary program loading device, and it may also be used as a plug-coupled maintenance tool.

"In the distributed computer system a dedicated control interface system is married to a dedicated minicomputer to accomplish one specific piece of process control or one specific support subsystem function," Sluis said. The interface system is made up of building blocks including an input module (8 x 8 matrix handling 64 digital functions, and represents an array of 8 16-bit computer words) and an output buffermodule (forms a 4 16-bit computer word) both of which are expandable.

The DCS concept to automatic routing or switching in a classification yard "is not only economically competitive with the relay switching systems, but it also offers data base establishment with car-following, inventory, and reporting functions on a per car basis from the established data base.

"This application can precisely fit the needs of an older yard or a new one. It may be commanded by the hump conductor through the conventional push-button input, it may be driven by punched paper tape, or it may receive its instructions from a switch list stored in a bulk storage device which is a part of this module—or which may a part of another module," Sluis said.

Other DCS building blocks can provide retarder control, an automatic calibration system, and an inventory and reporting subsystem.

Various factors are bringing the subject of inductive interference back into serious consideration by railway communications and signal men. They include more high voltage power lines in proximity to railroads—power system demand is doubling about every 10 years—railroad rights-of-way provide entrance into metropolitan areas, and also with power companies tying their lines together for transfer of power from one system to another, they create power grids that not only cross railroads, but are usually of the high-voltage type that create inductive interference. Railroads are a prime facility for power line location because the railway leads to areas of electric power usage and it is far easier for a power company to deal with one or two railroads for line easements rather than hundreds or thousands of individual land owners.

A panel discussion moderated by C. J. Nelson, general superintendent communications and signals, Rock Island, dealt with inductive interference. Other speakers included C. O. Jett, superintendent communications, Union Pacific, who made the point that if a power company creates interference, it can be made to correct the conditions at its expense. Jett suggested that such interference correcting conditions should be written into contracts the railroad has with power companies where power lines cross the railway. Each case of inductive interference or possible condition where interference might ensue has to be studied individually.

Means of reducing or eliminating inductive interference from nearby power lines, and especially in electrified railroad territory or where railroads have permitted electric utilities to construct power lines on their rights-of-way, were discussed by R. A. Dent, assistant electrical engineer, Gibbs & Hill, Inc., and A. Hvizd, chief engineer, The Kerite Company. Use of shielded cables, preferably underground, or aerial for signal and communications circuits of the railway reduce or eliminate inductive interference to these circuits.

R. F. White, GTE Lenkurt

"The 12 GHz microwave band provides a valuable segment of spectrum for the industrial user."

Solid-state components have been applied in vital logic circuits for signaling. For example, in the circuitry for highway-railroad grade crossing protection equipment controls, this approach has been applied by Harmon Electronics, Inc. "We have designed a basic non-safe dc logic circuit and have assumed that it may fail in a non-safe mode at any time. We have also designed along with this a safe ac check circuit that requires certain conditions to exist at all times, or else the system will be completely shut down and revert to its most restrictive mode," said R. E. Harmon, president.

"The disadvantages of solid-state logic are (1) slightly high current requirements; (2) greater susceptibility to surges; (3) limited experience in the use of such equipment; and (4) unfamiliarity to maintenance personnel. All of these disadvantages can be eliminated or improved upon in time, but must be considered at the present time.

"The advantages are as follows: (1) lower cost; (2) small space required; (3) greater design flexibility; and (4) easier installation. Over the years the advantages will outweigh the disadvantages. With the spiralling labor costs of today, new design and manufacturing techniques must be developed in the years to come," Harmon said.

CP Rail's new computer controlled yard at Calgary—Alyth—has a sustainable throughput of 3,000 cars daily. About one-third of its $14 million cost went for twin DDP 516 computers, the control and information system and the terminal centralized traffic control. A description of the information and control system and equipment was presented in a paper by D. H. Walkington, assistant engineer signals, CP Rail; and A. F. O'Rourke, regional manager, Uniswitch division, WABCO Ltd.

"Railway operation is inherently labor intensive at all levels. The real problem in a terminal is to keep everyone informed, on an almost minute to minute basis, of factors that will affect their work. One of our major objectives was to find means to help local yard supervisors do their job better. We felt this could be done by making more use of the hump computer. In addition to controlling the hump, the computer could best perform routine and repetitive tasks, and most importantly it could provide information to humans.

"The objective is to supply each yard supervisor with the information he needs, in a form and at a time that is convenient to him," Walkington and O'Rourke said. At Alyth, 13 model 35 KSR teleprinters and seven CRT display units are linked to the computers to keep supervisory personnel informed.

How to obtain more from

"We need to have a national freight car control and information system because we have no other quick way to create additional capacity. It is, in short, the quickest and cheapest way to get more out of what we have, and to need as little as possible of what the government will give to us," said Alan S. Boyd, president, Illinois Central, and keynote speaker at the Sept. 20-21 annual meeting of the Data Systems Division, AAR, at New Orleans, La.

The message is clear that railroads must improve car utilization or someone else will do it for them. "Top DOT officials routinely say that what the Class I railroads need is a car scheduling and control system," Boyd said. The Fastcor bill introduced into Congress proposes a government corporation to control railroad freight cars. All these signs, said Boyd, "are a signal for our need to take action—if we want to keep government intervention in the field of freight car control and distribution to a minimum."

An effective national car control and information system would:

—Increase equipment utilization and reduce car shortages on a free-moving, national basis matching capacity with changing demand.

—In conjunction with automatic car identification and the elimination ultimately, of much repetitive clerical work now expended keeping track of cars road-to-road result in very substantial reductions in rail administrative costs.

—Obviously eliminate the threat of government activity in the area of freight car management.

—Increase shipper satisfaction, and, it follows, result in enhanced railroad profitability.

"The rail industry knows it must have automatic car identification, but its value is hard to measure . . . Which of you would like to measure and report on upon the value of the telephone on your desk? Only by trying to think of our jobs without telephones can we get some inkling of their importance. So it is with aci.

"ACI will give us the opportunity to know, with less error, what is moving on the U.S. rail system as it moves. With that knowledge, and with that kind of national data base, we will be on our way toward being the truly national freight common carrier. If we are, it follows that our individual companies will benefit substantially from our increased capacity and service capability and from our obviously greater importance in the nation's affairs.

"The national matching of capacity with demand cannot but improve our use of equipment and ease the industry's squeeze for capital. Our ability to trace a car and report to our customers —no matter where the car may be off-line—is obviously going to improve our ability to help our shippers," Boyd said.

Couple this matching capability with aci and the industry's communications network that is spreading over the entire nation's trunk lines, and Boyd sees an opportunity for railroads on the magnitude of the diesel.

"More than one analyst has noted that the industry, quite likely, would have collapsed without dieselization because of its growing inability to generate enough cash from operations to maintain capacity. That's still our problem. The diesel allowed us survival time in the late fifties and sixties. The computer can be used to create the effective capacity control railroads need if they are to become super common carriers. Computers may very well be the instrument whereby the railroads ultimately recover from the competitive decline that began when the automotive age resulted in a national highway network," Boyd said.

Change is accelerating so rapidly in the computer world that planning computer hardware and software usage now should meet all possible futures, have room for alternatives. During the next decade computer operations will change from large operating systems of one or two central processors to many smaller CPU's operating in parallel, predicted Commander Grace Hopper, director of Navy programming languages division, department of the Navy.

Commander Hopper said that the large operating systems now being developed and proposed are increasing in complexity, require increased debugging functions and generally increase overhead costs. Costs can be reduced by operating minicomputers and communications networks. With minicomputers, the debugging process is less time consuming and less costly, often reducing software costs.

Modularzie and standardize are two key words for data processing, Commander Hopper told her Data Systems Division audience. Modularize programs so that under a multi-program environment, one can gain speed, can often run several modular programs in less time than one large operating systems program.

There is a need for a common data description language so that data can be transferred within an organization, and between organizations without special programs to provide conversion.

Commander Hopper had a word of caution concerning the trend of providing easy access to large data based systems—the trend fostered by the multiplicity of input/output terminals now available. Managers, she said, deal with totals, not details, therefore access to the data base should be limited in that a manager should be able to access only the information that he requires for managing. Can one imagine a railroad president requesting a listing of all cars held 24 hours or more at a specific terminal?

A large data base should be segmented into a number of smaller bases,

MANAGEMENT INFORMATION

From Alan Boyd's keynote address, through the workshops and including all speakers, the emphasis at the seventh Data Systems Division, AAR, annual meeting was on exploiting data systems, and the major effort is to make use of existing data bases. For example, keynote speaker Boyd (IC president) called for a national freight car control and information system which will use existing data now available on most railroads concerning car movements. The workshop on equipment utilization zeroed in on making use of existing data bases. L&N, for example, has improved its special car equipment utilization program with new computer programs, again using existing car movement data.

The tremendous amount of car movement, waybill and other data available makes it possible for railroads to interchange data. This aspect was explored at the meeting, and it was pointed out that the most efficient interchange will come about through the use of standard codes, and ultimately with standard formats. A good beginning has been made by some railroads on the interchange of data and indications are that this trend will accelerate rapidly.

existing railroad data systems

each of which could be handled by a minicomputer. Tied to a communications network, I/O devices could access an individual base. For example, traffic offices of a railroad could be linked to a minicomputer containing information of interest only to their work. Such a system would relieve a main computer of handling this work load. And, high-speed data links could serve to channel data from the main computer to the minicomputers. In providing these access systems, an intelligent terminal is needed, Hopper said.

A dangerous precedent is that of believing numbers from computers. The numbers are only as good as the people who put them in, process them and analyze the output, she said.

Major refinements have been made in Missouri Pacific's materials data system to provide automatic purchase orders. "In early 1970 the decision was made to upgrade the system. Our experience has shown there were times it was known well in advance that the quantities of material secured by the R&Q calculation (R= recorder point, Q= recorder quantity) would not satisfy our future needs and in the past a manual purchase order had to be prepared," reported H. M. Hoffmeister, vice-president, purchases and materials, MP; R. E. Rathert, manager of materials; and J. A. Kohlbrecher, senior procedures analyst, at one of the concurrent workshops.

"Our new system accepts input cards which we term 'Forced Requests for Material.' These requests are normally prepared by material warehouse personnel and transmitted via IBM 1050 to the St. Louis general office. Requests are checked by the materials department and sent to the purchasing department where vendor information is added only if a vendor has not been previously placed on our location record file. Forced requests for material may produce a purchase order on a vendor, transfer from another location or an order on our shops to repair or make material.

"Each week approximately 2,100 items are ordered. This constitutes an average of 560 purchase orders, 100 transfers and 12 shop orders. In the past eight months, the system has proved highly successful," Hoffmeister said.

MP total purchases during 1970 amounted to approximately $125 million, and during the first six months of 1971 materials valued at $32 million were disbursed throughout the MP-T&P system. The average monthly turnover ratio is 61.7%.

In the workshop on engineering applications of data systems, R. H. Knittel, manager engineering systems, Santa Fe, described a computerized method for handling excess dimension loads. "Our system is comprised of two programs called CLOG and CLEAR which respectively deal with the creation and udpating of the obstruction masters and the actual simulation of a given excess load configuration.

"For use in this application, the railway system has been divided into pre-

Commander Grace Hopper, U.S. Navy

"Planning for computer usage now should meet all possible futures."

determined 'routes' the limits of which have been dictated by either physical or operating features. Obstructions, i.e., bridges, tunnels, signal bridges, or any object with horizontal clearances, measured from center line of track, which are not in excess of the prescribed clearance envelopes now employed on the Santa Fe, are identified within each route as to their physical locations by means of division, district and state codes, track identification, i.e., westbound or eastbound, as well as by mile post location. In addition, selective curve data, as well as crossover locations, are included on the obstruction masters in order to facilitate simulation of excess dimension loads meeting or passing other equipment and the use of alternate or adjacent tracks respectively.

"Our simulation model is based on dividing both loads and obstructions into two-inch increments of height as measured from top of rail and then comparing loads with obstructions to determine clearance. After the details of each route have been verified, the data are placed on disk for direct accessing by the clearance program. We are compiling nearly 600 routes which require two complete 2314 disk packs for storage. In addition to the obstruction data for each route, we have also created a direct access file which contains special messages relative to the operating criteria for that segment," Knittel said.

"Santa Fe's clearance program is designed to provide uniform and accurate determination of movement of high, wide loads across the railway system or any portion thereof, taking into consideration such factors as: physical obstructions; combined weight of load and car; meeting or passing other equipment; position of load on car, either single or bolstered; load configuration, either concentric or non-concentric; lateral displacement of the load, including oscillation, rail and car wear; and track geometry consisting of curvature and super elevation.

"A summary message is displayed which will indicate the load can either move without restriction; that the load can move with restrictions as noted; or that the load is rejected. The output is designed for exception reporting only, thus if a load encounters no problems, display would consist only the general identification headings and the various route description data," Knittel said.

Southern's approach to service measurement is the use of a time performance analyzer system that utilizes information developed from the road's car movement history file, uses generalized information retrieval techniques, is on request by any department and the TPA system can produce up to 99 service study models per run.

"Generally speaking, the TPA produces a replication of the railroad environment in terms of activity segments (link/node model). TPA isolates the various elements of car movement. All elapsed time measurements are in hours and tenths of hours," reported R. C. Shamberger, equipment utilization an-

alyst, Southern, at one of the DSD meeting workshops.

"Each segment is identifiable in terms of primary responsibility; i.e., consignor, consignee, or carrier. By reconstructing movements in this manner, the location and magnitude of unnecessary delays and resultant poor service can be identified, isolated and dealt with. Each segment is defined in terms of a car movement transaction code, a car loaded or empty status code and an operating station (location) code. Experience to date has shown that in an average study from 95-98% of the expected traffic will be processed by the model. Measurement is from placed empty until next placed empty. Since TPA is currently confined to Southern only, a forwarded load is lost to the model once interchanged. A requestor can define a trip cycle of his own choosing and containing up to six activity segments, again of his own definition," Shamberger said.

At the automatic car identification workshop J. J. Schmidt, director of research services, Chesapeake & Ohio/Baltimore & Ohio, reported on progress in the labeling area. A specification for the aci label has been written and approved by the general committee of the Data Systems Division. Also developed are procedures for inspection and testing of module material including an AAR tester that can measure the brightness of the return light from a label (red vs blue, and white-measure of return of both red and blue light).

Certification procedures have been prepared for the AAR to certify label suppliers, and for the suppliers in turn to certify that their label material meets AAR specifications. Codes and records will be developed so that sampling procedures can be used to determine label quality and also provide for checking back on faulty labels.

Label maintenance and repair procedures have also been prepared. It has been decided that replacement of a single module is not acceptable because the greater brightness of the new module compared to the rest of the label modules creates malfunctions in the gain setting of the scanner. Also, the AAR price for single module replacement is too low to be economically feasible for individual module replacement. Hence, if a module is bad, the entire label is to be replaced.

As part of the label maintenance procedures, mandatory label cleaning and replacement schedules will be set up. These schedules will take into account the type of car and types of service under which the car operates. Label cleaning will be tied in with other work required for a car so that aci label work will be an incremental cost. It is planned that roads will place a bad order ticket on a car when it has a bad aci label. If the car is empty, it is to be sent to the rip track, but if loaded, the delivering road will repair the aci label after the car is unloaded.

Detailed results of the AAR's label evaluation and repair plan test on the Belt Railway of Chicago during July 1971 have not been completely analyzed (computer analysis now under way in Washington), but preliminary figures indicated approximately 6% bad labels were found. Trains were scanned at Forest Hill, and then inspected in BRC's Clearing yard and C&O's Rockwell yard after scanning. Of the 61,119 cars scanned, 52,423 valid readings were obtained. Of the 548 trains scanned, both sides of 343 trains were read by aci scanners, reported I. Gitlin, research engineer, AAR.

In the workshop on improved equipment utilization using existing data basis, J. W. Bosler, manager of car utilization, Louisville & Nashville, decribed his road's new system of control and utilization of special cars (developed with 10 years experience in computer-oriented car utilization programs). The new system consists of three basic fundamentals: (1) keeping assigned cars in their proper pools; (2) current adjustments in assignments to reflect peaks and valleys in loading patterns; and (3) minimizing the misuse of special cars by foreign carriers.

"We have a working computer program which automatically diverts cars to their proper pool as they develop empty on L&N. The most difficult task in accomplishing good utilization is to prevent serviceable cars from becoming idle. Today, we are minimizing idleness through a new daily computer-produced report which tells us at a glance the car situation at each pool.

As for finding out about cars on foreign lines, Bosler said: "Daily, from our computer, we receive a report which lists cars that have been off-line for what we consider an excessive amount of time." L&N then inquires of AAR's TRAIN system which provides a list of "the last four interchange movements on each car. From this, we can determine if our cars are still loaded or empty, if they are returning home properly, if they are moving circuitously or if they have been misused in any fashion. We have been pleasantly surprised by the amount of cooperation received from other railroads when requested to intercept our overdue cars and send them home.

"While it is almost impossible to mea-

Robert A. Petrash, AAR

"Approximately 94-95% of the freight car fleet is now equipped with aci labels."

J. W. Germany, SP

"Railroads will have to make changes to meet industry requirements for data exchange."

"Feedback from aci scanners enables us to prepare and update demurrage records."

L. I. Dillenbeck, P&PU

NEWS BRIEFS

(Continued from page 6)

the Commission for further proceedings to determine what remedy for the existing discriminatory sharing practices would be just, fair and reasonable, and as to what rates resulting therefrom would be just and reasonable.

"We have given careful consideration to the option open to us in this matter and are of the view that it is highly desirable to bring about the removal of the unlawful discrimination found to exist in the telpak sharing provisions at the earliest practicable date. "We conclude therefore that the carriers should be ordered to remove the unlawful discrimination without any order by the Commission as to the precise method by which the carriers shall accomplish this objective."

AAR task force set up for car controls

A new railroad task force to design a national car information and control system will be headed by Richard P. deCamara, vice-president administration, Illinois Central. Work will be under the direction of a steering committee consisting of R. B. Curry, vice-president, management systems, AAR; W. J. Harris, vice-president research and test department, AAR; and R. R. Manion, vice-president operations and maintenance, AAR.

The objectives of the task force are to design a system that will:

—Increase equipment utilization.

—Reduce car shortages.

—Increase customer satisfaction.

—Decrease capital requirements for new equipment.

—Reduce administrative costs.

—Enhance railroad profitability.

To accomplish this, the task force will first seek to define adequate indicators of freight car utilization. The group will also examine the TRAIN and ACI programs. Although the two programs are separate and distinct, it is hoped that both will contribute substantially to the new national car information and control system. Part of the task force's job will be to determine if these and other programs already in operation can be expanded to provide the data that will be needed.

"We believe," said Stephen Ailes, AAR president and chief executive officer, "that the national system should be built around existing management information systems. But it is understood that system redesign may entail some modification of such systems. It is also understood that it will be expensive and will require a high degree of industry cooperation and discipline. But, the benefits to be derived from the project make it worthwhile."

At the conclusion of its study—hopefully in about nine months—the task force will present the AAR board of directors, which authorized the project, a set of recommendations for action, along with an analysis of costs and benefits.

The members of the task force will be recruited from the railroad members of the AAR and will include representatives from such fields as traffic, data systems, transportation, car service and communications.

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Personnel Manager, Western-Cullen division, Federal Sign & Signal Corp., 2700 West 36th Place, Chicago, Ill. 60632

WMATA lets signal contract to GRS

A contract in the amount of $42,074,675 by unanimous vote of the board of directors of the Washington Metropolitan Area Transit Authority has been awarded to General Railway Signal Co. The WMATA board decided to refrain from awarding the contract covering the communications system, which had been included in GRS's low bid of $59,567,737 for a complete system embracing both automated train control and communications. Instead, it was decided to revise the specifications for the communications system and readvertise those for competitive bidding. The communications portion would have been largely performed by Motorola Inc. under subcontract, and GRS will work closely with Motorola to win the contract award when the communications system is rebid.

The signal contract will cover the automatic train control system for the initial 36 miles of track and 37 pas-

(Please turn to page 34)

Letters

To the Editor:

A preliminary draft of the Bureau of Railroad Safety's suggested revision to the Signal RS&I was submitted to the Brotherhood of Railroad Signalmen and the Association of American Railroads for comment. The Bureau of Railroad Safety staff is now in the process of revising the preliminary draft and revising these comments and suggested changes [from AAR and BofRS]. When the revised draft is completed it will then be prepared by chief counsel for publication in the Federal Register as a notice of proposed rule making. Publication will probably not occur before Feb. 1, 1972. Interested persons will then be given an opportunity to comment in writing on the proposed rule and all comments will be considered by the Federal Railroad Administrator before issuance of a final rule. If a hearing is held, it will be a legislative, non-adversary hearing. Consequently, cross examination will not be permitted.

Mac E. Rogers, Director
Bureau of Railroad Safety

Editor's Comment: On the opposite page are the comments of the Association of American Railroad's the Brotherhood of Railroad Signalmen and the preliminary draft rule proposals of the Federal Railroad Administration's Bureau of Railroad Safety.

To the Editor:

Concerning the report published in August 1971 issue of *Railway System Controls* on radio propagation tests, it should be of interest that the actual tests were carried out by an Ad Hoc Committee on Radio Control Locomotives. Tests were accomplished by the committee with the cooperation of Southern, Motorola Communications & Electronics, and the Signal & Communications division of WABCO.

Name Withheld on Request

sure in dollars the success of any given car utilization system, the labor force needed to operate it is surely a major item justifying its existence. On the L&N in the last 10 years, we have had two major car utilization systems, mechanized control and our present system. In 1965, our car utilization bureau was staffed with 28 employees; today, it has 17 operating a much superior system. The type of work formerly done by 11 people is now performed by our computer. This force reduction was made possible through improved computer techniques in both hard and software and above all, by credible input data," Bosler said.

At the network simulation model workshop it was brought out that at least four railroads are making use of the AAR's network model. About one-third of the computer time is spent on preprocessing and simulation operations, with the remaining two-thirds computer time spent on post processing operations. Wayne K. Minger, manager data systems special projects, AAR, also reported that a program is now available for writing the history file into four parts for output. This will facilitate car tracing in the model or enable one to determine details about a car at a specific time in the simulation.

Concerning a 15 days operation using the network model, Dr. Ronald W. Drucker, assistant vice-president research, analytical techniques, C&O/B&O, said that machine times for the computer were as follows: preprocessing—20 minutes; simulation—40 minutes; and post processing—3 hours. Also Drucker said that the network model had been successfully used for traffic and service studies.

CP Rail has applied the AAR network model for making system and terminal studies. In the system study area projects have covered train schedules, marshalling policies at major terminals, the transportation of grain by unit trains, and the effect on the fast freight trains operating in the same area. In the terminal area, studies included the forecasting of future resource and facility requirements at existing or planned terminals, and the effect of alternate train processing methods.

Canadian National has installed five aci scanners at Calder yard in Edmonton. Data from the scanners is transmitted directly into a Hewlett-Packard 2116 8k computer. "The core is used fully in handling moving trains, listing out one train, transmissions in and out and providing about 100 carrier index conversions. To go to either data enhancement or a data checking function will require that more core be plugged into the computer," reported W. G. Webster, project officer, CN, at the workshop on minicomputer applications.

At the time of installation, only GTEIS model 800 scanners were available. "An evaluation was made of the two alternatives, vis, standard GTEIS model 800 equipment with 83B polling which CN had used elsewhere or install a minicomputer as a real time data concentrator and output controller. The cost advantage was distinctly towards the computer approach. The capital cost of spares was not included in either system nor the cost of programming or maintainer training," Webster said.

ACI covers P&PU

Peoria & Pekin Union has blanketed its East Peoria, Ill. yard with nine automatic car identification scanners to provide for automatic process control of its terminal management system. The scanners are grouped in threes at each of three locations, and one label decoder processor (minicomputer) is coupled to each group of three scanners. *(Railway System Controls, July 1971, pages 12-24).*

"Yard inventory in the East Peoria yards has progressed from a manual operation to an automatic process control system. By placing the scanners on all major arteries feeding into the East Peoria yard, we were able to eliminate all physical checking of cars moving into or out of the terminal. The feedback from the aci scanners gave us the ability to maintain a computer inventory of the yard and East Peoria industries, outdating the need for manual PICL files," said L. I. Dillenbeck, director of management information systems, P&PU, at the DSD annual meeting.

One of the major functions of aci was the total support of the terminal company's car accounting system. By scanning all cars in and out of P&PU, manual input to the system has been eliminated. "This, of course, is resulting in complete and accurate records, saving thousands of dollars annually in penalty per diem and clerical costs," Dillenbeck said.

"The automatic feedback from yard scanners gives the P&PU the ability to update and prepare all demurrage records for East Peoria industries. By merging the scanner readings from inbound trains with billing information, the system automatically prepares industrial car notification and constructive placement reports which are mailed every 12 hours to all Peoria and Pekin industries. At the same time a demurrage record is created for each car terminating on our line, containing all necessary data except the actual set and release times. As the car moves into or out of the industrial area, the scanner feedback automatically merges the set or release time, as per average agreement with the industry. Additionally, all interplant switching between Caterpillar Tractor Co.'s various plants at East Peoria is automatically calculated by feeding pertinent scanner readings to industrial programs. All demurrage bills are automatically prepared by the system using the aci scanner readings as physical verification of accuracy."

A three-digit, color-coded secondary label is applied by Caterpillar personnel to cars upon loading at their plant. "The secondary label will strictly give us three numeric digits and this coupled with the label decoding processor and scanner number, gives the system a unique five digit number that will correspond to a file number. This file number will correspond to billing information and automatically create the bill, as well as updating the existing waybill information on file for the car," Dillenbeck said.

The pressure from rail shippers demanding better service and the ability of many large shippers to measure the quality of rail service should be stimulus enough for interroad data exchange. While the need is to work for coding standards—and railroads are involved—a plea for more interroad exchange of data was made by J. W. Germany, general manager system management services, Southern Pacific Transportation Co. If waybill information can be transmitted sufficiently in advance of train arrivals, a receiving road will have time to reformat the data for its own use.

The need for coding standards for all transportation modes was reinforced by E. A. Guilbert, president, Transportation Data Coordinating Committee. Cargo moves today at the speed of administering the paper work, and it can be moved faster if the paperwork can be computerized and mechanized. There is a need for standardized codes. For example, to ship pencils from Peoria, Ill. to Paris, France, 17 commodity classifications are now used. It would be possible with standard codes to move cargo across the U.S. using 77 characters (codes) and only 240 characters for an international cargo movement.

TDCC has endorsed the use of the 7 numeric digit Standard Transportation Commodity Code and the 6 numeric digit Standard Point Location Code. With three more digits, the SPLC code can be used for worldwide shipments.

Signal rules may be changed

The rules, standards and instructions for the installation, inspection, maintenance and repair of signal systems, devices and appliances are now under revision. Federal Railroad Administration has sent its proposed revisions to the Association of American Railroads and the Brotherhood of Railroad Signalmen. Replies have been sent to FRA by the AAR and the BofRS.

Following are the proposed changes by FRA and alongside to make comparison fairly easy are comments from AAR and the BofRS. Under FRA rule proposals, material in *italic* is to be deleted from present rules. Material in **bold face** is to be added to present rules. All other material in the FRA columns remains the same as present rules.

AAR comments

Part 236—INSTALLATION, INSPECTION, MAINTENANCE AND REPAIR OF SIGNAL SYSTEMS, DEVICES AND APPLIANCES.

First paragraph of 236.0 should be revised as follows: (1) There shall be provided on that part or parts of lines over which any train is operated at a speed of 60 or more miles per hour, an automatic block signal system which shall conform to these rules, standards and instructions, or a manual block system which shall conform to the following conditions: etc.

Second paragraph should be revised as follows: (2) There shall be provided on that part or parts of lines over which any train is operated at a speed of 100 or more miles per hour, an automatic train stop or train control system or automatic continuously controlled cab signal system which shall conform to these rules, standards and instructions.

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

PART 236—INSTALLATION, INSPECTION, MAINTENANCE AND REPAIR OF SYSTEMS, DEVICES AND APPLIANCES

236.0 Signal Systems where required.

1. There shall be provided on that part or parts of lines over which any passenger train is operated at a speed of 60 or more miles per hour, or any freight train is operated at a speed of 50 or more miles per hour an automatic block signal system which shall conform to these rules, standards and instructions, or a manual block system which shall conform to the following conditions:

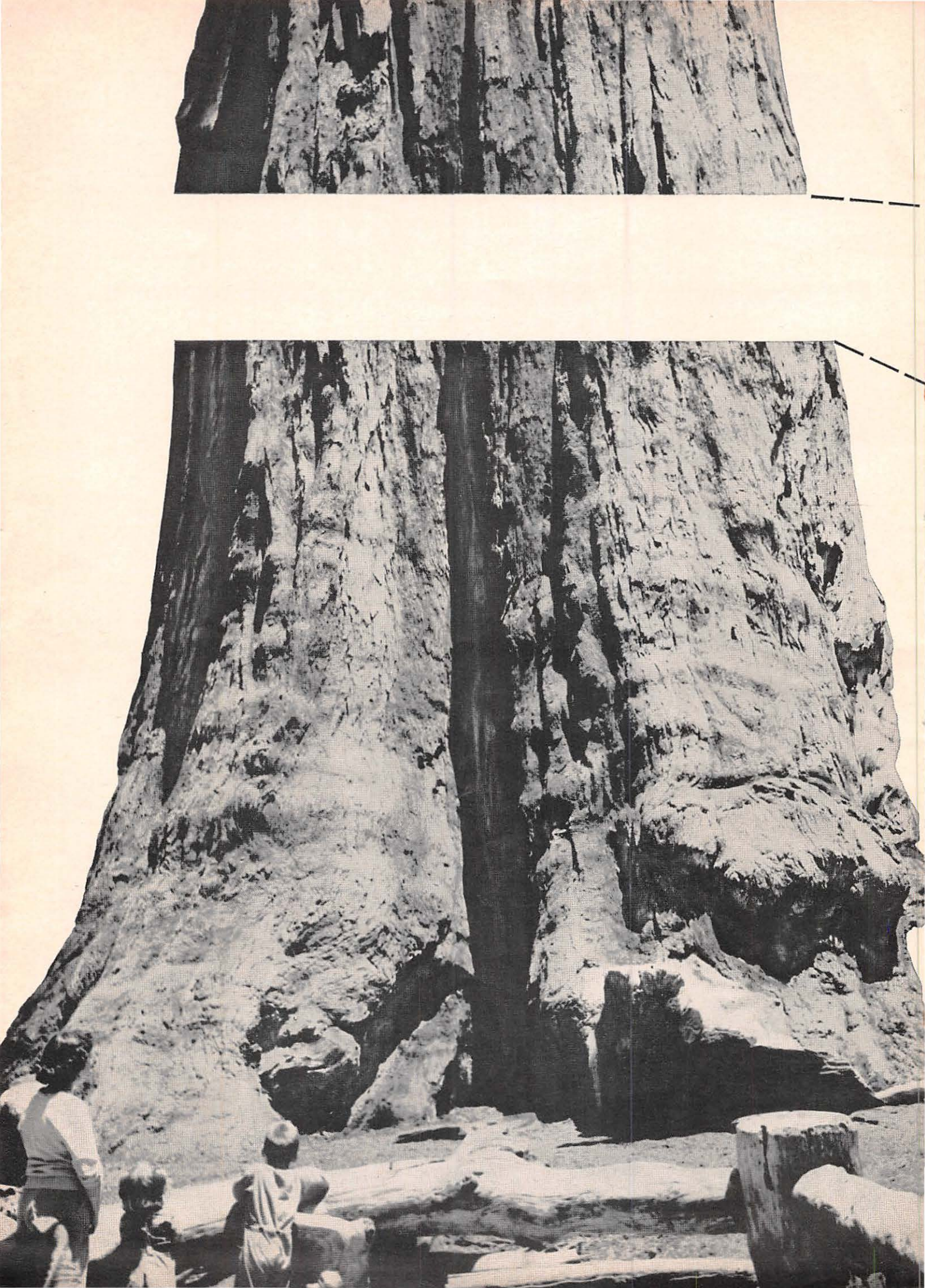
A passenger train will not be admitted to the block when occupied by another train, except under flag protection; no train will be admitted to the block when occupied by an opposing train or by a passenger train, except under flag protection; and a train other than a passenger train will not be permitted to follow a train other than a passenger train into the block, except when authorized by a train order, permissive signal or prescribed form, and when such movement is so authorized the following train must proceed prepared to stop short of a train or obstruction, but not to exceed 15 miles per hour.

2. There shall be provided on that part or parts of lines over which any passenger or freight train is operated at a speed of 80 or more miles per hour an automatic train stop or train control system or automatic continuously controlled cab signal system which shall conform to these rules, standards and instructions.

236.000 Applicability of this part, **and relief from the requirements of this part.**

(a) The following rules, standards and instructions are hereby approved

BofRS comments



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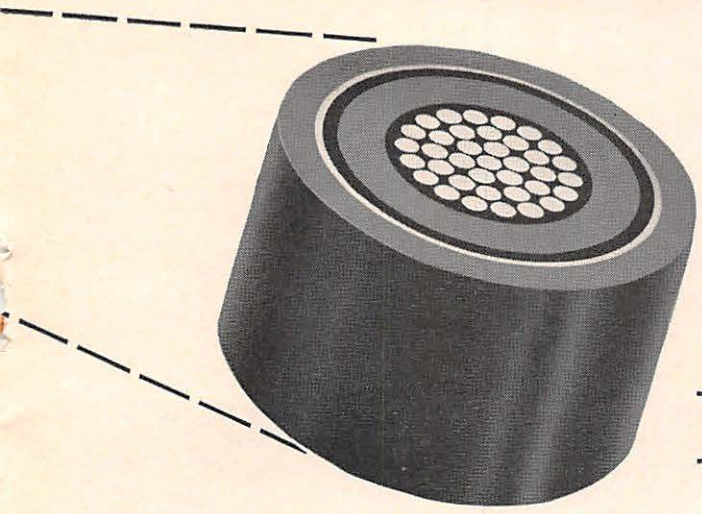

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AAR comments

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

and prescribed for observance by each *common* carrier subject to the provisions of Section 26 of Title 49 of **the** United States Code.

(b) Relief from the requirements of this part will be granted upon adequate showing by an individual carrier.

(c) Relief heretofore granted to any carrier shall constitute relief to the same extent as relief granted under the requirements of this part.

Subpart A Rules and Instructions:

ALL SYSTEMS

General

STANDARDS

236.1 Plans, where kept. Track layout plan, circuit plan and where mechanical locking is used, locking sheet and dog chart, shall be kept at each interlocking and circuit plans shall be kept at each controlled point in traffic control *systems;* **system territory;** circuit plan for each automatic signal shall be available at the headquarters of the employee directly responsible for the maintenance of such signal, copies of all of the foregoing plans and profile plan, drawn to scale showing locations of signals, grades and alinement, for the sections of railroad under the jurisdiction of a *divisional* **the division** signal *supervisory officer* **supervisor** shall be kept at his headquarters; copies of plans pertaining to signal and interlocking facilities under the jurisdiction of general, regional or system signal officers shall be kept at their offices. All plans shall be correct and legible and available for use by the Federal Railroad Administration (FRA) representatives.

236.2 Grounds. Each circuit, the functioning of which affects the safety of train operations, shall be kept free of any ground or combination of grounds which will permit a flow of current equal to or in excess of 75 percent of the release value of any relay or other electromagnetic device in the circuit, *except circuits which include any track rail and except the* . **The provisions of this rule shall not apply to any track rail or** common return wires of single-wire, single break, signal control circuits using a grounded common, and alternating current power distribution circuits which are grounded in the interest of safety.

236.3 Locking of instrument cases and interlocking machine cabinets.

BofRS comments

236.1 Plans, where kept. Track layout plan, circuit plan, and where mechanical locking is used, locking sheet and dog chart, shall be kept at each interlocking and circuit plan shall be kept at each controlled point in traffic control systems; circuit plan for each automatic signal shall be available at the headquarters of the employee directly responsible for the maintenance of such signal; copies of all of the foregoing plans, and profile plan, drawn to scale, showing locations of signals, grades and alinement, for the sections of railroad under the jurisdiction of a divisional signal supervisory officer shall be kept at his headquarters; copies of plans pertaining to signal and interlocking facilities under the jurisdiction of general, regional or system signal officers shall be kept at their offices. All plans shall be correct, legible, complete and contained in one set. When circuit changes are made, all plans shall be completely corrected within 15 days after the work has been completed. Such plans shall be immediately available to Federal Railroad Administration (FRA) representatives.

AAR comments

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

Outdoor signal and instrument cases shall be **kept** locked except signal mechanism housings at interlockings where **signal** maintenance forces are continuously on duty. Power interlocking machine cabinets, time releases, and electric locks exposed on interlocking machines shall be locked or sealed.

236.4 Interference with normal functioning of device. The normal functioning of any device shall not be interfered with in testing or otherwise without first taking measures for *insuring* **providing for** safety of train operation which depends on normal functioning of such device.

236.5 Design of control circuits on closed circuit principle. All control circuits the functioning of which affects safety *on* **of** train operation shall be designed on the closed circuit principle, except circuits for roadway equipment of intermittent automatic train-stop system.

236.6 Hand-operated switch equipped with switch circuit controller. *Hand operated switch equipped with switch circuit controller connected to the point, or with facing point lock and circuit controller, shall be so maintained* **Switch circuit controller connected to the point of a hand-operated switch, or a facing point lock with circuit controller connected to the point of a hand-operated switch shall be so installed** that when point is open one-fourth inch or more on facing-point switch and three-eighths inch or more on trailing point switch, track or control circuits will be *opened* **open** or shunted or both, and if **switch is** equipped with facing point lock with circuit controller, switch cannot be locked. **Contacts of switch circuit controller shall have an opening of not less than one-sixteenth inch when fully open.** On such hand-operated *switch*, **switches,** switch circuit controllers, facing-point locks, switch-and-lock movements, and their connections shall be securely fastened in place, *and contacts maintained with an opening of not less than one sixteenth inch when open.*

236.7 Circuit controller operated by switch-and-lock movement. Circuit controller operated by switch-and-lock movement shall be *maintained* **installed** so that normally open contacts will remain closed and normally closed contacts will remain open until

BofRS comments

236.4 Interference with normal functioning of device. The normal functioning of any device shall not be interfered with in any manner, including signal or efficiency testing, without first taking measures for insuring safety of train operation which depends on normal functioning of such device.

AAR comments

Rule 236.9 Selection of circuits through indication or annunciating instruments. This rule should be deleted.

Rule 236.10 Electric locks. This rule should be revised to read as follows: Electric locks installed shall be of the forced drop type. Note: Does not apply to electric locks installed prior to October 1, 1950.

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

the switch is locked.

236.8 Operating characteristics of electromagnetic *apparatus* **devices.** Operating characteristics of electromagnetic *apparatus,* **devices, the functioning of which affects safety of train operation,** shall be *maintained in accordance with the limits within which such apparatus is* **those within which the devices are** designed to operate.

236.9 Selection of circuits through indicating or annunciating instruments. signal control and electric locking circuits shall not be selected through the contacts of instruments designed primarily for indicating or annunciating purposes in which an indicating element attached to the armature is arranged so that it can in itself cause improper operation of the armature.

236.10 Electric locks, *force drop type; where required.* **All** Electric locks *on new installations and new electric locks applied to* **installed or replacements on** existing installations shall be of the forced drop type.

236.11 Adjustments, repair, or replacement of component. When any component of a system or interlocking, the proper functioning of which is essential to the safety of train operation, fails to perform its intended signaling function, it shall be adjusted, repaired or replaced without undue delay.

236.12 Spring switch signal protection; where required. Signal protection shall be provided for facing

BofRS comments

236.8 Operating characteristics of electromagnetic apparatus. Operating characteristics of electrical and electronic signal apparatus shall be maintained in accordance with the limits within which such apparatus is designed to operate.

236.10 Electric locks, force drop type; where required. Electric locks shall be of the forced drop type.

236.11 Adjustment, repair or replacement of component. When any component of a system or interlocking, the proper functioning of which is essential to the safety of train operation, fails to perform its intended signaling function, it shall be adjusted, repaired or replaced without undue delay.

The following components of signal systems subject to this rule are illustrative of the type of components subject to this rule: relay, battery, circuit controller, electric lock, switch-and-lock movement, track rails in signaled territory (including points and frogs), switch rods, broken bond wire, broken wire in control circuit, defective signal lamp bulbs, indicator light out on traffic control machine, and wayside signals displaying false restrictive signals.

False proceed failures and potential false proceed failures and conditions shall be investigated and corrected with all deliberate speed.

It is the intent of this rule that repairs and adjustments to defective signal components be made before or prior to the next train movement over the involved territory.

236.12 Spring switch signal protection; where required. Signal protection shall be provided for facing and

AAR comments

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

and trailing movements through spring switch within interlocking limits, and through spring switch *hereafter* installed in automatic block signal, trainstop, train control or cab signal territory where train movements over the switch are made at a speed exceeding *20* **30** miles per hour, except that signal protection shall be required only with the current of traffic on track signaled for *movement* **movements** in only one direction.

Note—Does not apply to spring switches installed prior to October 1, 1950.

BofRS comments

trailing movements through spring switch within interlocking limits, and through spring switch in automatic block signal, trainstop, train control or cab signal territory where train movements over the switch are made at a speed exceeding 20 miles per hour, except that signal protection shall be required only with the current of traffic on track signaled for movement in only one direction.

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

236.13 Spring switch; selection of signal control circuits through circuit controller. The control circuits of signals governing facing movements over a main track spring switch shall be selected through the contacts of a switch circuit controller, or through the contacts of relay repeating the position of such circuit controller, which, when normally closed switch point is open one-fourth inch or more, will cause such signals to display their most restrictive aspects, except that where a separate aspect is displayed for facing movements over the switch in the reverse position the signal shall display its most restrictive aspect when the switch points are open one-fourth inch or more from either the **the** normal or reverse position.

236.14 Spring switch signal protection; requirements. (a) The indication of signal governing movements from siding to main track with the current of traffic on track signaled for movements in only one direction through a spring switch in automatic block signal territory shall be not less restrictive than "Proceed at Restricted Speed" when the block, into which movements are governed by the signal, is occupied, and shall be "Stop" when the main track is occupied by a train approaching the switch within at least 1,500 feet in approach of the approach signal located stopping distance from the main track signal governing trailing movements over switch except that the indication may be caused to be less restrictive if approach or time locking is used.

(b) The indication of signal governing movements against the current of traffic from the reverse main of main tracks to a single track, or signal governing movements from a siding to a main track signaled for movements in either direction, through a spring switch, in automatic block **signal** territory shall be not less restrictive than "Proceed at Restricted Speed" when the block, into which movements are governed by the signal, is occupied by a preceeding train, and shall be "Stop" when the block on the single track into which the signal governs is occupied by an opposing train.

(c) The indication of **a** signal governing movements against the current of traffic from the reverse main of main tracks to a single track or signal governing movements from a siding to a main track signaled for movements in either direction through a spring switch in automatic block signal territory shall be "Stop" when the normal direction main track of the double track or the single track signaled for movements in both directions is occupied by a train approaching the switch within at least 1,500 feet in approach of the approach signal located stopping distance from the main track signal governing trailing movements over switch, except that indication may be caused to be less restrictive if approach or time locking is used.

236.15 Timetable instructions. Automatic block, traffic control, trainstop, train control and cab signal territory shall be designated in timetable instructions **or other written instructions.**

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

236.16 Relief. Relief from the requirements of this part will be granted upon an adequate showing by an individual carrier. Relief heretofore granted to any carrier by order of the Federal Railroad Administration (FRA) shall constitute relief to the same extent from the requirements of this part.

ROADWAY SIGNALS AND CAB SIGNALS

236.21 Location of roadway signals. Each roadway signal must be *(a)* positioned and aligned so that the indication it displays can be clearly associated with the track it governs. *and (b) located over or to the right of the track it governs in other than single track territory.*

236.22 Semaphore signal arm; clearance to *other* objects. At least one-half inch clearance shall be provided between semaphore signal arm **or smashboard** and any object that may interfere with its operation.

AAR comments

Rule 236.23 In subparagraph (a) (2) correct lense to lenses and in (b) insert comma after letters and delete "and".

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

236.23 Aspects and indications. (a) Aspects shall be shown by the position of semaphore blades, color of lights, position of lights, **absence of lights,** flashing of lights or any combination thereof. They may be qualified by marker plate, number plate, letter plate, marker light, shape and color of semaphore blades or any combination thereof, subject to the following conditions: (1) *Night aspects of roadway signals, except qualifying appurtenances, shall be shown by lights; day aspects by lights or semaphore arms.* A single white light shall not be used. (2) Reflector *lenses* **lense** or buttons or other **similar** devices *which depend for visibility upon reflected light from an external source* shall not be used in night aspects except **on inoperative approach signals or** qualifying appurtenances.

(b) The aspects of cab signals shall be shown by lights, or by illuminated letters **and numbers or symbols.**

(c) Each aspect displayed by a signal shall be identified by a name and shall indicate action to be taken. Only one name and *identification* **indication** shall apply to those aspects indicating the same action to be taken; the same aspect shall not be used with any other name and indication.

(d) The fundamental indications of signal aspects shall conform to the following: (1) A red light, a series of horizontal lights or a semaphore blade in a horizontal position shall be used to indicate stop. (2) A yellow light, **a yellow reflector,** a lunar light, or a series of lights or a semaphore blade in the upper or lower quadrant at an angle of approximately 45° to the vertical, shall be used to indicate that speed is to be restricted and stop may be required. (3) A green light, a series of vertical lights, or a semaphore blade in a vertical position in the upper quadrant or 60° or 90° in the lower quadrant shall be used to indicate proceed at authorized speed.

(e) The names, indications and aspects of roadway signals and cab signals shall be defined in Block Signal and Interlocking Rules in effect on each railroad subject to these rules, standards and instructions. Copy of such Block Signal and Interlocking Rules shall be filed with the Federal Railroad Administration *within six months after the date of this order and copy of subsequent* **Any** modifications shall be filed with *said* **the** FRA within thirty days after such modifications *become effective.* **took place.** *Such rules and any modifications thereof shall remain in effect until otherwise ordered by the FRA.*

236.24 Spacing of roadway signals. Each roadway signal shall be located with respect to the next signal or signals in advance which *govern* **governs** train movements in the same direction so that the indication of a signal displaying a restrictive aspect can be complied with by means of a brake application, other than an emergency application, initiated at such signal, either by stopping at the signal where a stop is required, or by a reduction in speed to the rate prescribed by the next signal in advance where reduced speed is required.

236.25 **26** False restrictive position of semaphore *signal* arm or failure of lamp in light signal. If an arm of a semaphore signal assumes a false restrictive position or if a lamp in a light signal fails the signal shall not display a less restrictive aspect than intended.

236.25 Approach signal where required. A signal shall be provided on main track to govern the approach with the current of traffic to any home signal except where the home signal is the first signal encountered when leaving yards or stations. An inoperative signal displaying an aspect indicating "approach next signal prepared to stop" may be used to govern the approach to a home signal. An approach signal is not required to govern the approach to a signal governing the approach to an interlocking in other than automatic block signal or traffic control system, or to a signal governing the approach to the first signal in either an automatic block signal or traffic control system.

236.26 **27** Buffing device, *maintenance.* Buffing device, **when used,** shall *be maintained so as* not *to* cause the signal to display a less restrictive aspect than intended.

236.27 **28** Phantom signal *aspect.* Measures shall be taken to prevent recurrence of a phantom signal aspect.

TRACK CIRCUITS

236.51 Track Circuit requirements. Track relay **or any similar device that functions as a track relay controlling home signals** shall be in **the** deenergized position whenever any of the following conditions exists, and the track circuit of an automatic trainstop,

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

train-control, or cab-signal system shall be deenergized in the rear of the point where any of the following conditions exists:

(a) When a rail is broken or a rail or switch frog is removed except when a rail is broken or removed in the shunt fouling circuit of a turnout or cross over, provided, however, that shunt fouling circuit may not be used in a turnout through which permissible speed is greater than 45 miles per hour. It shall not be a violation of this requirement if a track circuit is energized: (1) When a break occurs between *the* end of *a* rail and track circuit connector, within the limits of rail-joint bond, *appliance* **appliance** or other protective device, which provides a bypath for the electric current, or (2) As a result of leakage current or foreign current in the rear of a point where a break occurs or a *railroad* **rail** is removed.

(b) When a train, locomotive, or car occupies any part of a track circuit, including fouling section of turnout except turnouts of hand-operated main track crossover. It shall not be a violation of this requirement where the presence of sand, rust, dirt, grease, or other foreign matter prevents effective shunting, except that where such conditions are known to exist adequate measures to safeguard train operation must be taken.

(c) Where switch shunting circuit is used: (1) *Switch point* **Point of switch within track circuit** is not closed in normal position. (2) *A switch is not locked where* **Switch within track circuit and equipped with** facing point lock with circuit controller is *used* **not locked.** (3) An independently operated fouling-point derail equipped with switch circuit controller is not in derailing position. **(4) Point of independently operated inside switch equipped with circuit controller, the normal position of which was established for the purpose of preventing engines or cars from entering the track circuit, is not closed in normal position.**

236.52 Relayed cut-section. Where relayed cut-section is used in territory where non-coded **non-reversible** direct-current track circuits are in use, the energy circuit to the adjoining track **circuit** shall be open and the track circuit shunted when the track relay at such cut-section is in deenergized position.

236.53 Track circuit feed at **railroad** grade crossing. At grade crossing

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

with an electric railroad where foreign current is present, the electric energy for non-coded direct current track circuit shall feed away from the crossing.

236.54 *Minimum length of* **Short** track circuit. *The length of any track circuit, except trap circuit or special circuit not used for control of signaling facilities, shall be greater than maximum inner wheel base of any locomotive or car.*

When track circuits shorter than maximum wheel base of any locomotive or car operated over such track circuits are used for control of signaling facilities, associated circuits must provide protection.

236.55 Dead section; maximum length. Where dead section exceeds 35 feet, special circuit shall be installed. Where shortest outer wheel base of a locomotive **or self-propelled car** operating over such dead section is less than 35 feet, the maximum length of the dead section shall not exceed the length of the outer wheel base of such locomotive **or car** unless special circuit is used.

236.56 Shunting sensitivity Track circuit **controlling home signals or approach locking** shall be *so maintained* **installed so** that track relay **or similar device that functions as a track relay** will be in deenergized position *if, when track circuit is dry,* a shunt of 0.06 ohm resistance is connected across the track rails of the circuit, including fouling sections of turnouts **where shunt fouling circuit is required.**

236.57 *Shunt wires.* **Switch shunting circuit.** *Shunt wires and fouling wires, except shunt wires to switch circuit controller through which signal control circuits are controlled and track circuits are shunted, shall consist of at least two conductors and each shall be sufficient conductivity and maintained in such condition that the track relay will be in deenergized position when the circuit is shunted.*

In track circuits controlling home signals, the connections between track rails and switch circuit controller shall consist of at least two conductors, each of which shall be of sufficient conductivity so that the track relay or similar device which functions as a track relay will be in deenergized position when circuit is shunted. The provisions of this rule shall not apply

AAR comments

Rule 236.54 This rule should be revised as follows: **Short track circuit.** When track circuits shorter than the maximum inner wheel base of any locomotive or car operated over such track circuits are used for control of signaling facilities, associated circuits or other means must provide protection.

Rule 236.55 Dead section, maximum length. Words "self-propelled car" should be deleted since RS&I definition of locomotive covers.

BofRS comments

236.56. Shunting sensitivity. Track circuit or its electronic equivalent shall be so maintained that track relay will be in deenergized position if, when track circuit is dry, a shunt of 0.06 ohm resistance is connected across the track rails of the circuit, including fouling sections of turnouts.

AAR comments

Rule 236.58 Turnout, fouling section. The first four lines of this rule should be revised as follows: Track circuits within automatic block signal system territory, traffic control system territory or interlocking limits controlling home signals shall extend at least to clearance point of turnouts, except turnouts of crossovers, and electrical connections of shunt fouling circuits shall conform to the following:

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

to the connections to circuit controllers through which track circuits or other signal control circuits are opened.

236.58 Turnout, fouling section. *Fouling section of turnout* **Track circuits controlling home signals** shall extend **at least** to clearance point **of turnouts, except turnouts of crossovers, and electrical connections of shunt fouling circuits shall conform to the following:**

(a) The long transverse connection between outside rail of shunt fouling circuit and outside rail of main track circuit shall consist of at least two conductors, each of which shall be of sufficient conductivity so that track relay or similar device which functions as a track relay will be in deenergized position when shunt fouling circuit is shunted.

(b) The short transverse connections at track frogs and heels of track switches shall consist of a stranded conductor or at least two solid conductors.

236.59 Insulated rail *joints* **joint.** Insulated rail joints shall be *maintained in condition* **installed so as** to prevent sufficient track *circuit* current from flowing between the rails separated by the insulation to cause a failure of any track circuit *involved* **controlling a home signal or an approach locking circuit.**

WIRES AND CABLES

236.71 Signal **control line** wires on pole lines. Signal **control line** wires carried on pole lines shall be securely tied in on insulators **and insulators securely fastened in place. Poles supporting signal control line wires shall be guyed and braced as necessary.**

236.72 Clearance or overhead signal wires and cables. Where men are permitted to be on top of cars, the clear space between the lowest overhead signal line conductor and the top of track rails shall be not less than 27 feet at 60°F., no wind. The distance may be reduced to 25 feet for guys and for cables carried on messengers.

236.73 **72** Open-wire transmission line, clearance to other circuits. Open-wire transmission line operating at voltage of 750 volts or more shall be placed not less than 4 feet above the nearest crossarm carrying signal or communication circuits.

BofRS comments

236.59 Insulated rail joints. Insulated rail joints shall be maintained in condition to prevent track circuit current from flowing between the rails separated by the insulation.

236.71 Signal wires on pole lines. Signal wires carried on pole lines shall be securely tied in on insulators, and insulators securely fastened to proper bracket or crossarm. Poles on which such wires are carried shall be properly guyed and braced, where necessary on corners and to avoid storm damage.

The battery or power supply for each signal control relay circuit, where an open-wire circuit or a common return circuit is used, shall be located at the end of the circuit farthest from the relay.

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51	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**	**121**	**122**	**123**	**124**
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AAR comments

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

236.*74* **73** Protection of insulated wire; splice in underground wire. Insulated wire shall be protected from mechanical injury. The insulation shall not be punctured for test purposes. Splice in underground *wire* **cable** shall have insulation *resistance at least* **characteristics** equal to **or better than those of** the wire spliced.

236.*75* **74** Insulated wires and cables; supports. Insulated wires and cables used aerially shall be supported on insulators or by messengers.

236.*76* **75** Interference of wires with operating parts of *mechanisms.* **mechanism.** Wires shall **be arranged so as** not **to** interfere with operating parts of mechanisms.

236.*77* **76** Tagging of wires. Each wire shall be tagged or otherwise marked so it can be identified at each terminal. Nomenclature shall correspond to that of the circuit plan. Tags or other marks of identification in instrument cases and apparatus *housings* **housing** shall be *made* of insulating material and shall **be arranged so as** not **to** interfere with moving parts *or* **of** apparatus.

236.*78* **77** Lightning arrester. Lightning *arrester* **arresters that require grounding** shall be *properly* connected *and* **to** ground *maintained* with a resistance to ground preferably **of** not more than 25 ohms.

INSPECTIONS AND TESTS ALL SYSTEMS

236.101 Purpose of inspections and tests; *removal from service of relay failing to meet test requirements.* The following inspections and tests shall be made in accordance with specifications of the carrier subject to approval of the FRA to determine if the apparatus *and/or equipment* is maintained in condition to perform its intended function. Relay or other electromagnetic device **the functioning of which affects the safety of train operation,** which fails to meet the requirements of specified tests shall be removed from service *and shall not be restored to service* until its operating characteristics are in accordance with the limits within which such relay or electromagnetic device is designed to operate. **When circuit changes are made or relays or other devices are removed or replaced, tests shall be made to determine that the portion of the sys-**

BofRS comments

236.77 Tagging of wires. Each wire shall be tagged showing correct circuit nomenclature so that it can readily be identified at each relay and/or cable termination. Nomenclature shall correspond to that of the circuit plan. Tags or other marks of identification in instrument cases and apparatus housings shall be made of insulating material and shall be arranged so as not to interfere with moving parts of apparatus. Tags or other marks of identification shall not be made of paper or similarly destructible material. Each wire shall be tagged to correspond to the current circuit plan and shall reflect current changes and additions in the circuitry at the location and in the network.

AAR comments

Rule 236.103 Switch circuit controller. Rule should be revised to read: Switch circuit controller inspection and adjustment test shall be made at least once every six months.

Rule 236.104 Circuit controller operated by switch and lock movement. Revise as follows: Circuit controller operated by switch and lock movement shall be inspected at least once every six months and maintained so that normally open contacts will remain closed and normally closed contacts will remain open until switch is closed.

Rule 236.105 Shunt fouling circuit. Revise as follows: Shunt fouling circuit shall be inspected and tested at least once every six months.

Rule 236.106 Electric lock. Revise as follows: Electric locks except forced drop type shall be tested at least once every five years.

Rule 236.108 Lightning arresters. Revise as follows: Gas and vacuum type lightning arresters used on signal circuits, the functioning of which affects safety of train operation shall be tested at least once a year.

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

tem involved is functioning as intended.

236.102 **Electric semaphore** Signal mechanism. **Electric semaphore** Signal mechanism shall be inspected at least once every six months and tests of the operating characteristics of all parts shall be made at least once every two years.

236.103 Switch circuit controller. Switch circuit controller **inspection and adjustment test** shall be *inspected and tested* **made** at least once every three months.

236.104 Circuit controller operated by switch and lock movement. Circuit controller operated by switch and lock movement shall be inspected at least once every three months and maintained so that normally open contacts will remain closed and normally closed contacts will remain open until switch is closed.

236.*104* **105 Shunt fouling circuit.** shall be inspected and tested at least once every three months.

236.*105* **106** Electric lock. Electric *lock.* **locks** except forced drop type shall be tested **at least** once every two years.

236.*106* **107** Relays **and searchlight type signal mechanism.** All *relay* **relays** in service, *except locomotive relay,* **the functioning of which affects safety of train operation and searchlight signal mechanisms** shall be tested at least once *every two* **each five** years.

236.*107* **108** Lightning arresters. Gas and vacuum type lightning arresters shall be tested at least once *a* **each** year.

236.108 Insulation resistance tests. Insulation resistance tests shall be made when wires, cables, and insulation are dry. Wires and cables, except wires connected directly to track rails, shall be tested in accordance with the following schedule. Conductors shall be promptly repaired or renewed when insulation resistance is below the following values: (Descriptions identical to those under BofRS proposal will be deleted.)

BofRS comments

236.102 Signal mechanism. Signal mechanism, including searchlight mechanism, shall be inspected at least once every six months, and tests of the operating characteristics of all parts shall be made at least once every two years.

236.103 Switch circuit controller. Switch circuit controller shall be inspected and tested at least once every three months in order to assure compliance with Rules 236.6, 236.7, 236.11, 236.13, 236.51, 236.57, 236.77, 236.203, 236.205, 236.303, 236.334, 236.333 and 236.342.

236.107 Lightning arresters and resistance of made grounds. Gas and vacuum type lightning arresters and ground rods shall be tested at least once a year.

236.108 Insulation resistance tests. Insulation resistance tests shall be made when ends of wires, cables, and insulation are dry. Wires and cables, except wires connected directly to track rails, shall be tested before they are put in service; they shall be tested again in two years and subsequently in accordance with the schedule contained in this rule. Conductors shall be promptly repaired or renewed when insulation resistance is below

AAR comments

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

BofRS comments

the following values:

Low voltage (660 volts or less) wires and cables with insulation and protective outer covering not specifically designed for underground use, any part of which is underground or in trunking. Period—5 years. Minimum allowable resistance—1 megohm.

Low voltage (660 volts or less) wires and cables with insulation and protective outer covering not specifically designed for underground use, no part of which is underground or in trunking. Period—8 years. Minimum allowable resistance—1 megohm.

Low voltage (660 volts or less) wires and cables with insulation and protective outer covering designed specifically for underground use, or in underground conduit, or as submarine cable. Period—8 years. Minimum allowable resistance—1 megohm.

Local signal wiring. Period—8 years. Minimum allowable resistance—1 megohm.

Lead covered signal power cable. Period—8 years. Minimum allowable resistance—100 megohms between sectionalizing switches.

Underground signal power lines not lead sheathed. Period—5 years. Minimum allowable resistance—40 megohms for voltages up to and including 660 volts for section tested. 100 megohms between sectionalizing switches for voltages exceeding 600.

236.109 Ground test. Tests for grounds on signal circuits the functioning of which affects safety of train operation shall be made before being placed in service and at least once every year thereafter. The provisions of this rule shall not apply to any track rail or common return wires of single-wire, single-break signal control circuit using a grounded common, and alternating current power distribution circuits which are grounded in the interest of safety.

236.109 Records of results of tests; forms for keeping records; where filed. Results of tests and inspections made in compliance with these rules shall be made on a form approved by the FRA. The report shall be subscribed and sworn to, before an officer authorized to administer oaths, by the inspector or employee who made the inspection, and by the officer in charge. Such form shall show name of railroad, place and date, equipment tested, repairs, replacements, adjustments made, and condition in which apparatus was left, and signature of employee making the test. Each form shall be filed in the office of a divisional officer of the division on which the tests were made.

A duplicate copy of this report shall be transmitted to the U.S. inspector for the district in which the signal system or device is located.

Rule 236.110 Time releases and timing relays. Revise first sentence to read as follows: Time releases and timing relays used for approach or

236.110 Time releases and timing relays. Time releases and timing relays used for approach or time locking shall have interval tested at least once

AAR comments

time locking shall have interval tested at least once every two years.

Rule 236.112 Insulated rail joint. Revise to read as follows: Insulated rail joints in track circuit controlling home signals or approach locking shall be inspected at least once each year and shall be maintained in such condition to prevent sufficient track circuit current from flowing between rails separated by the insulation to cause a failure of any such track circuit.

Rule 236.113 Buffing device. Revise as follows: Buffing device shall be inspected at least once every six months and maintained so as not to cause the signal to display a less restrictive aspect than intended.

Rule 236.114 Records of results of tests; forms for keeping records; where filed. Revise as follows: Results of foregoing inspections and tests shall be recorded on forms approved by the FRA. Each form shall be filed in the office of a divisional officer of the division on which the tests are made.

FRA proposals

Words in *italic* to be deleted and words in **bold face** to be added to rules.

each year. The timing shall be maintained at not less than 90 percent of the predetermined time interval, which shall be shown on plan or marked at the timing device.

236.111 Track Circuits. Track circuits controlling home signals or approach locking shall be tested at least once every year and so maintained that track relay or similar device that functions as a track relay will be in deenergized position when a shunt of 0.06 ohm resistance is connected across the track rails of the circuit.

236.112 Insulated rail joints. Insulated rail joints in track circuit controlling home signals or approach locking shall be tested at least once each year and shall be maintained in such condition to prevent sufficient track circuit current from flowing between rails separated by the insulation to cause a failure of any such track circuit.

236.113 Buffing device. Buffing device shall be inspected and tested at least once every six months and maintained so as not to cause the signal to display a less restrictive aspect than intended.

236.*109* **114** Records of results of tests; forms for keeping records; where filed. Results of **foregoing inspections and** tests *made in compliance with Rules 236.102 to 236.108 inclusive, 236.376 to 236.387, inclusive, and 236.576, 236.577, 236.588, and* 236.589 shall be recorded on forms *provided by the railroad,* **prescribed by the FRA.** *Such forms shall show name of railroad, place and date, equipment tested, repairs, replacements, adjustments made, and condition in which apparatus was left, and signature of employee making the test.* Each form shall be filed in the office of a divisional officer of the division on which the tests *were* **are** made.

Subpart B AUTOMATIC BLOCK SIGNAL SYSTEMS
STANDARDS

236.201 Track circuit control of signals. The control circuits for home signal aspects with indications more favorable than "proceed at restricted speed" shall be controlled *automatically* by track circuits extending through the entire block.

BofRS comments

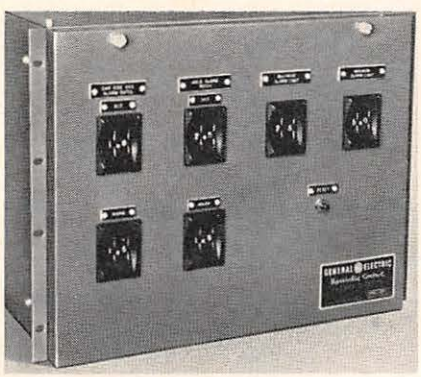
CONTINUED NEXT MONTH

Product News

Format generators have clock (101)

A family of format generators is available including a date and time generator controlled by a digital clock. These generators can be locally or remotely controlled and are suitable for generating pre-fixed messages and this equipment is ideal for header generating followed by subsequent messages.

The equipment provides automatic generating of the hours, minutes, day, month, station identification, codes etc. Unique with this equipment is the insertion of a sequential message number. The date and time generator provides for full flexibility in programming for its standard 32 characters with the capability of expanding the capacity in increments of 32 characters. This equipment functions completely automatic and has incorporated controls to operate associated data terminals. The standard date and time generators provide line signaling for both 5-level baudot and 8-level ASCII and selective speeds of up to 2400 baud. *Kameco Electronics, Inc.*

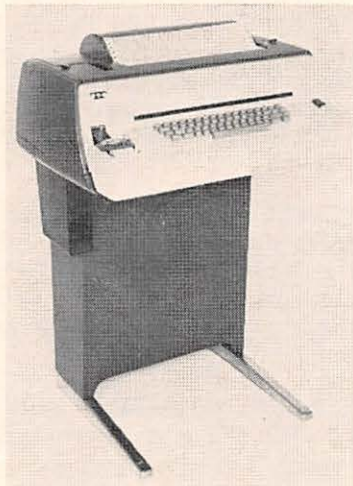


Data evaluator is for hotbox detector (102)

A new hotbox detector data evaluator is designed to simulate the capabilities of a highly skilled chart reader in evaluating data. The device can be coupled with a new optional data converter which will store and convert the inspection data to a formatted ASCII code message for printing or tape punching.

The data evaluator overcomes the disadvantages of previous automatic alarms which use a maximum limit pip or a fixed ratio above base. The new evaluator analyzes the analog temperature rise above ambient of each journal of each car as it passes. It calculates the average rise for each car side and then compares each journal on a given side of the car to the calculated average for that side to establish its ratio. Warning outputs are given whenever the resulting ratio exceeds adjustable preset values for (1) warm and (2) hot. The same process occurs simultaneously and independently for both sides of the car.

The data evaluator may be used by itself to operate directly into the conventional railroad signal system or into a wayside hotbox detector visual display panel. Whenever required, a chart recorder may be added in parallel with the data evaluator to provide a permanent record. *General Electric Co.*



Teletype terminal has ulc capability (103)

The new line of Teletype 38 terminals includes the ASR (automatic send-receive), KSR (keyboard send-receive) and RO (receive-only) terminals with an optional built-in modem. The 38 data terminal will feature the capability of both upper and lower case print-out and also a wide platen which will allow a standard 132 character line at 10 characters per inch. Text can be sent or received on-line on standard 14⅞" wide computer paper stock.

All units in the model 38 line will operate at speeds of 100 words per minute (10 characters per second). The 38 keyboard generates the full 128 ASCII code combinations with vertical parity. *Teletype Corporation.*

Printer operates via VHF radio (104)

Hard copy messages from an unattended mobile radio are now possible. A new booklet describes how the compact mobile printer unit produces permanent hard copy messages at the rate of 280 wpm and is easily incorporated into existing communication networks. *Xerox Corp.*

Log tape system has 24 hr backup (105)

Logging tape recording systems can provide 24-hr backup for VHF radio systems. Models TR 1710 and TR 1720 are capable of handling up to 10 or 20 channels of communication simultaneously, and can be programmed to incorporate an exact time source that is injected on tape to correlate recorded information with actual time. Recording time capacity ranges from 12 to 32 hr depending upon recording speed and tape length. Tapes are furnished in 3600 ft and 4800 ft lengths. *Magnasync/Moviola Corp.*

I/O terminal has CRT display (106)

A new feature of the CC-30 communications station is the capability to generate and display the full APL character set on a standard black & white or color television set. The CC-30 is a portable, input/output CRT terminal designed to provide immediate "on-line" access to the central computer. One of the features of the CC-30 is the ability to generate any alphanumeric character.

The CC-30 communications station consists of the following components: a CC-300 TV receiver, a CC-301 TV display controller, a CC-302 telephone coupler or dataphone interface, and a CC-303 APL keyboard designed to resemble a common APL keyboard. Additional options such as card readers, light pens, and hard-copy devices may be attached to the terminal. *Computer Communications, Inc.*

People

BURLINGTON NORTHERN: Arthur L. Essman, director signal engineering, retired Oct. 1. **William G. Pearson,** project engineer signals, at St. Paul, Minn., appointed regional signal engineer at Chicago succeeding **D. H. Thomsen,** appointed assistant director of signal engineering at St. Paul. **C. H. Dunn,** assistant director signal engineering appointed director signal engineering succeeding Essman.

CHESAPEAKE & OHIO/BALTIMORE & OHIO: W. E. Goodman appointed assistant supervisor signals at Richmond, Va. **R. Paul Williams,** director of data systems development, appointed assistant vice president-data services Baltimore, Md.

DENVER & RIO GRANDE WESTERN: T. L. Hutton named director-management information services at Denver. **L. D. Beebe** appointed signal supervisor, Salt Lake City. **E. M. Curtis** appointed assistant signal supervisor, Denver. **F. A. Dunham** appointed assistant signal engineer Denver. **H. V. Eason** appointed assistant signal supervisor Helper, Utah. **D. H. Jamison** appointed assistant signal supervisor Glenwood Springs, Colo. **H. S. Law** appointed signal supervisor Denver. **E. E. Stephens** appointed assistant signal supervisor Grand Junction, Colo. **W. J. Witthans** appointed assistant to signal engineer Denver.

GULF, MOBILE & OHIO: W. M. Costello, assistant signal engineer, appointed signal engineer at Bloomington, Ill. **J. M. Wuerpel,** supervisor signals and communications, appointed assistant signal engineer. **M. D. Ellis,** signal foreman, appointed signal supervisor with headquarters at Jonesboro, Ill.

MISSOURI PACIFIC: Charles L. Rucker, assistant superintendent communications, appointed superintendent communications succeeding **J. Robert French,** retired. **George T. Williams,** supervisor data communications, appointed assistant superintendent communications at St. Louis.

NORFOLK & WESTERN: Robert A. Kipley appointed purchasing agent-maintenance of way/signals and communications succeeding **Clarence N. Ferguson,** retired.

PITTSBURGH & LAKE ERIE: C. Roy Holley, staff industrial engineer, Pittsburgh, appointed manager

C. H. Dunn
Burlington Northern

Raymond E. Deasy
Western-Cullen

industrial engineering succeeding **John M. Weber,** resigned to accept a position with the American Institute of Industrial Engineers at Atlanta, Ga.

SANTA FE: L. H. Simon, construction engineer communications, retired July 1.

TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS: J. E. Pinson appointed director—management services.

Suppliers

C&D BATTERIES: E. R. Casey appointed sales engineer, Chicago.

HALLICRAFTERS CO.: Donald R. McCormick appointed sales manager, mobile products and systems. **Dale A. Hoppe** appointed western manager, land-mobile sales and systems with headquarters at Encino, Cal.

OKONITE CO.: Victor A. Viggiano, president and general manager of the wire and cable div., appointed president and chief executive officer. **James H. Gresh** appointed manager—Denver district, Denver, Colo.

TELECOMMUNICATIONS INDUSTRIES INC.: Walter F. Burren, sales application engineer, appointed national sales manager at Copiague, N.Y.

WESTERN-CULLEN DIV., FEDERAL SIGN & SIGNAL CORP.: Raymond E. Deasy, marketing supervisor, Illinois Tool Works, appointed director of sales and marketing.

Obituaries

CHARLES R. POWDERMAKER, manager systems engineering General Railway Signal Co., died recently.

H. L. BLACK, retired signal engineer, Canadian National, died recently.

JOHN HENSEL, retired signal engineer, Western-Cullen division, Federal Sign & Signal Corp., died recently.

J. D. ROGERS, retired superintendent of communications, New York, New Haven & Hartford, died recently.

W. G. SALMONSON, retired manager operating rules, Pennsylvania, died recently.

L. W. SMITH, retired assistant superintendent telegraph and signals, Milwaukee Road, died recently.

R. E. TAYLOR, retired signal engineer, New York, New Haven & Hartford, died recently.

H. J. VINSKY, retired hearing examiner, Interstate Commerce Commission, died recently.

A. V. WILSON, supervisor communications and signals, Seaboard Coast Line, died recently.

NEWS BRIEFS

(Continued from page 18)

senger stations. Included is the controls center for the entire 98-mile network, as well as on-board control systems for the first 300 cars. Design objectives call for system operations on a fully automated basis at a maximum speed of 75 mph with trains operating 90 seconds apart during rush hours. Trains will normally operate without human intervention although each train is expected to have an attendant who could exercise control manually if required.

AAR asks FCC to look at telpak sharing

Association of American Railroads, among others, has asked the Federal Communications Commission to reconsider its telpak sharing order. FCC simply told the telephone and telegraph companies to stop discrimination. They have, by filing a tariff effective Dec. 12 that eliminates section 3.2.5 (B) (3) of private line tariff No. 230 which provides for telpak sharing

by regulated, governmental and right-of-way telpak customers.

According to *Telecommunications Reports*, AAR emphasized its view that the FCC's action "flies in the face of the court's plain directive," and does not comply either "in letter or in spirit." Belknap Freeman, manager of communications facilities, Penn Central, saw increased billing of $45,000 a month without any change in service.

GMA study shows 2,000 more cars for loads

In a terminal such as Chicago, an automatic car identification system could provide an estimated 2,081 more freight cars available for loading in a year's time. So stated a recent *Railway Age* article describing a study made by a task force of the Chicago General Managers' Association. How additional cars can be generated is explained this way:

An advance consist, produced by the district-wide scanner-sharing system could effectively knock two hours from the time a car spends in a terminal yard each day. Those two hours, multiplied by the approximately 25,000 cars which are interchanged in the district each day, can easily be translated into the 2,081 additional cars per year that could be available in Chicago, the study reveals.

Not only would this advance consist produced by the aci system benefit carriers through better car utilization, the study continues, but shippers too would stand to gain. Today, for example, if a shipper in the terminal district should order 30 general-purpose cars, it would take a railroad car distributor three days to round them up and get them to this particular customer's loading dock, the task force figures.

The sources of these 30 cars would be: (1) Empties checked in on the railroad's own yard tracks; (2) empties available on industrial tracks; (3) empties en route to the terminal; and (4) empties on hand at the road's nearest terminal or at other terminals on that particular system. The cars in the latter category, records show, would represent about one-third of the 30 cars ordered and would take the longest time to make their appearance.

Armed with the time-saving aci advance consist that could be generated the moment a train passed a delivering line's outbound scanner, a receiving road's car distributor could, the task force figures, initiate action which would drastically cut car delays. An entire day might, in fact, be trimmed from the time normally taken to fill the shipper's car order.

The detailed report prepared by the task force for GMA serves up this example of how time—and ultimately, money—might be saved in handling cars in the Chicago terminal with the aid of an aci system:

Today, a train of 50 cars might take over four hours to move from a delivering yard to a receiving yard and finally be prepared for distribution out of the latter. On the other hand, the same train operating in a terminal under control of an aci system could be ready for distribution in the receiving road's yard in just 3¼ hrs.

While the transit time in both of these hypothetical cases would remain the same, the report points out, the time required to handle cars in the receiving yard would be quite different. The aci-generated advance consist, for one thing, would cut about 25 minutes from the time normally required to check the train, stamp waybills and prepare and review switch list with yard conductor and switch crew. Another 25 minutes would be saved in the handling of this 50-car

(Please turn to page 36)

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NEWS BRIEFS

(Continued from page 35)

train due to the advance knowledge of its make-up, the report continues.

Aside from doing a better job of satisfying customers' needs, the task force study adds, railroads would be able to reduce car-hire costs in the terminal if aci were on the scene. Furthermore, they would be able to cut down on the costly practice of moving empties (oftentimes unnecessarily) from other terminals. If, for example, just 10 cars a day could be placed in the hands of a shipper one day sooner than is now possible, the car-hire savings would amount to almost $2,200 a month, the task force estimates.

Among the firms mentioned as contenders for the contract, or a portion of it, are: ACI Systems Corp.; Executive Computer Systems Inc.; GTE Informations Systems Inc., and IBM. It has been estimated that between $5 million and $8 million in hardware, including 109 scanners and 100 decoders, would be needed to capture all the train movements within the district. Altogether, there are 7,689 miles of track in the CTD over which 1,100 trains are operating in a 24-hour period. The task force has determined that 40 scanner locations would be sufficient to permit complete surveillance of the district.

Fate of the GMA aci scanner-sharing project is expected to be decided at any time now. After screening the task force's study, the GMA Steering Committee made its recommendations to the association's Executive Committee. Final decision on what action will be taken, however, will have to come from the 23 member roads.

If the GMA members should elect to support the scanner-sharing system, in all likelihood a separate, non-profit corporation would be established to direct the operation, one of the member roads reported. It had been estimated earlier that 20 months might be required to make the system operational after the GMA had given the signal to proceed. If the task force's recommendations are followed, equipment for the system would be leased rather than purchased outright.

Consulting firm does signal work

Thomas K. Dyer, Inc., consulting engineers, Lexington, Mass. has recently increased its signal engineering service by the addition of Richard B. Whalen, formerly field signal engineer, Boston & Maine, to head its signal section. The Dyer firm now engaged in railroad and transit engineering will provide signal layout and design engineering, contract circuit and detail plans, estimates, specifications and system cost analysis.

U.S. Steel will radio control locomotives

General Railway Signal Co. has received an order from U.S. Steel Corp. to equip ten locomotives at Fairfield, Ala. for radio control. The locomotives will be operated by personnel on the ground using portable transmitters. Radio control will be achieved by a tone-modulation system which allows for discrete control of as many as 64 locomotives with 16 different control commands from operators as far as one-half mile from their respective locomotives.

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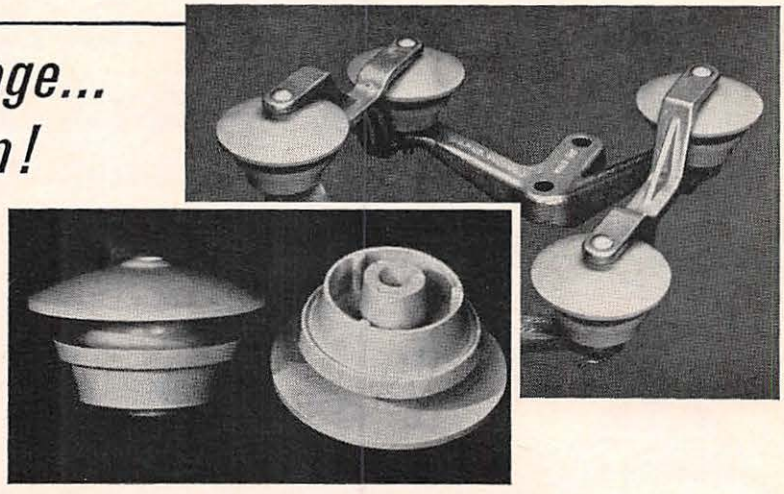

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Books

Book on field-effect transistors available

"ABC's of FET's" by Rufus P. Turner, deals in detail with the principles of field-effect transistor operation and stresses the applications of FET's in practical circuits.

In the first chapter, the author discusses the basic theory of the FET. In the second chapter, he helps the reader become better acquainted with the FET by describing a number of basic tests and measurements dealing with FET parameters. Chapter 3 discusses design considerations of elementary FET circuits, whereas Chapter 4 describes several typical applications for the FET in various circuits.

ABC's of FET's, Rufus P. Turner, 1970, Howard W. Sams & Co. Inc., Indianapolis, Ind. 46268, 96 pages, softbound; Price: $2.95.

Book on solid-state circuits available

"Understanding Solid-State Circuits" starts off with a discussion of discrete semiconductors: diodes, transistors and their operating modes, SCRs, FETs, light-sensitive devices, voltage-sensitive elements, etc. Then comes a subject of vital interest to all phases of electronics: linear amplification. The information presented in the second chapter covers DC and AC feedback, current gain, controlling current and voltage gain, phase inversion, plus other aspects related to amplification.

Chapter 3 offers a discussion of power amplification using single and push-pull stages, complementary symmetry, and protection circuits, while Chapter 5 presents a thorough treatment of feedback and its applications, including grounded-emitter feedback FET stabilization, high-frequency losses, equalization, rolloff, synthesized response, and filter alignment. Chapters 5 and 6 explain sinusoidal oscillators and function generator circuits, respectively. From the basic circuits (tuned-circuits, phase-shift, half-bridge, and twin-T types) the text advances to multivibrators, frequency and amplitude variation, triangular, sawtooth, and stairstep generators, and divider circuits. From this point, the discussion moves into gain-controlled amplification, the types of control in current use, the "Hall" effect, limiting and compression, expansion, attenuators, etc.

Understanding Solid-State Circuits by Norman H. Crowhurst, 1970, TAB Books, Blue Ridge Summit, Pa. 17214. 192 pages. Price: $7.95 hardbound, $4.95 paperbound.

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STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION

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8. The known bondholders, mortgagees, and other security holders owning or holding 1 percent or more of total amount of bonds, mortgages or other securities: None

9. Not applicable.

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A. Total no. copies printed (Net Press Run) Average is 4,200, Single issue nearest filing date is 4,000.

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2. Mail subscriptions. Average is 2,794; Single issue nearest filing date is 2,567.

C. Total Paid Circulation. Average is 2,794; Single issue nearest filing date is 2,567.

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F. Office use, left-over, unaccounted, spoiled after printing. Average is 128; Single issue nearest filing date is 91.

G. Total. Average is 4,200; Single issue nearest filing date is 4,000.

I certify that the statements made by me above are correct and complete.

(Signed) Robert G. Lewis
Publisher

Editor's Corner

C&S meeting rates high

For a change of pace in annual meeting formats, the Communication & Signal Section, AAR, held five workshop sessions at its Oct. 5-7 convention in Bal Harbour, Fla. Attendance—60 to 70 per workshop—amount of discussion and information transfer indicated that the workshop concept was well received. The nucleus of each workshop was a standing committee of the Section, which provided an orientation or focal point for discussion.

The workshop concept has several benefits: (1) It enables those in attendance to freely discuss matters of common interest—and in Bal Harbour without having the session officially recorded. (2) Workshops foster participation by all levels of design, engineering and management personnel. (3) Because of their focus on specific topics—often designed for the specialist—discussion can be in considerable depth and detail as compared to material presented to a general audience. (4) As part of a general meeting, workshops can provide an area of special interest to members, yet not detract from the entire program.

WORKSHOPS ARE BENEFICIAL

At Bal Harbour on Tuesday afternoon, the two concurrent communications workshops—(1) microwave and radio systems, and (2) communications and data systems—gave the communications specialists something of interest, yet provided an opportunity for the signal oriented person time to visit the equipment exhibits. On the following afternoon, three concurrent signal workshops were held—(1) highway grade crossing protection, (2) signal practices, and (3) education and training. During these workshops, communications men had the opportunity to visit the exhibits.

The morning sessions on the three days—Tuesday through Thursday—were devoted to talks, papers and committee reports of interest to both communications men and signal personnel.

Such balanced programming went far to make this 11th annual meeting of the Communication & Signal Section one of its more successful conventions.

The annual meeting is one opportunity for the communications or signal man to gain and to give knowledge and participate in discussion with others in areas of mutual interest. Another opportunity is to work on C&S committees. Committee work provides one with a deep satisfaction of being involved. Even those who are not on C&S Section committees can participate, mainly due to the volume of work required by the standing committees. For example, the advance reports show that most committees have more assignments than they have members. Accordingly, they must seek help from others. Consulting members do work on committee assignments, but there is a need for wider participation among the railroad members of the C&S Section.

EVERYONE SHOULD PARTICIPATE

You can participate in committee work by sending your comments, suggestions or even volunteer to work on assignments, by writing to any of the following committee chairmen:

Inductive Interference Committee—H. M. Robertson, assistant to superintendent communications, Union Pacific.

Radio Liaison Committee—L. R. Thomas, general superintendent communications and signals, Santa Fe.

Signal Liaison Committee—J. R. DePriest, superintendent communications and signals, Seaboard Coast Line.

ACI Hardware Committee—C. A. Crouch, superintendent communications, system, Santa Fe.

Committee A: Outside Plant Facilities—C. E. Shaw, assistant signal engineer, Louisville & Nashville.

Committee B: Radio and Microwave Systems—K. F. Galitz, electronics engineer, Rock Island.

Committee C: Communications and Data Systems—E. F. Hutchinson, assistant director communications, Burlington Northern.

Committee D: Highway Grade Crossing Protection—D. H. Thomsen, assistant director signal engineering, Burlington Northern.

Committee E: Interlocking, Traffic Control and Block Signal Systems—O. C. French, superintendent signals, system, Santa Fe.

Committee F: Car and Engine Control Systems—C. H. Dunn, director signal engineering, Burlington Northern.

Committee G: Education and Training—J. J. Foster, chief signal, electrical and communications officer, Reading.

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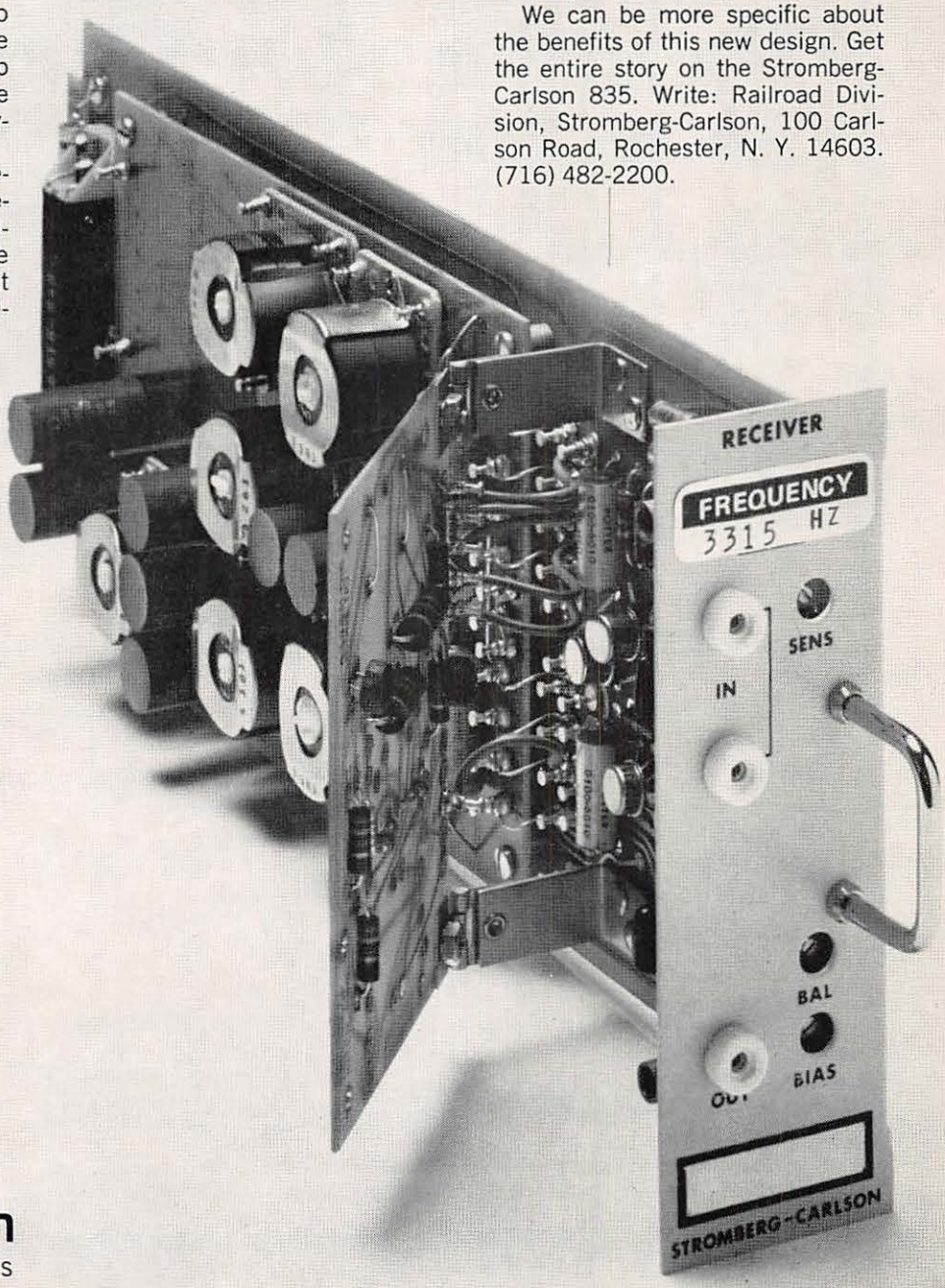

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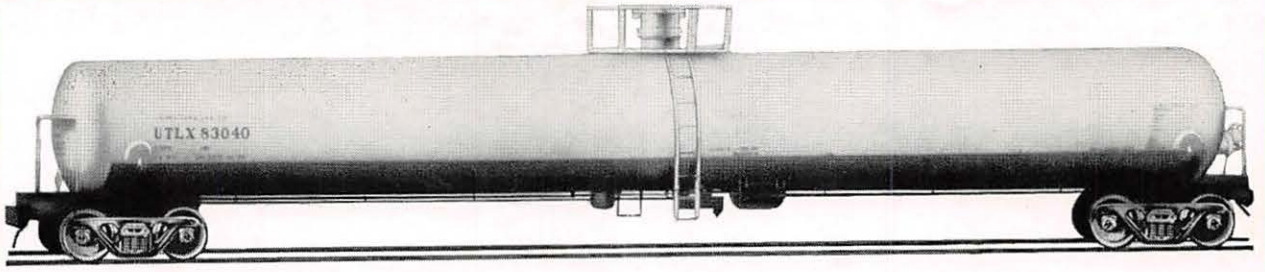

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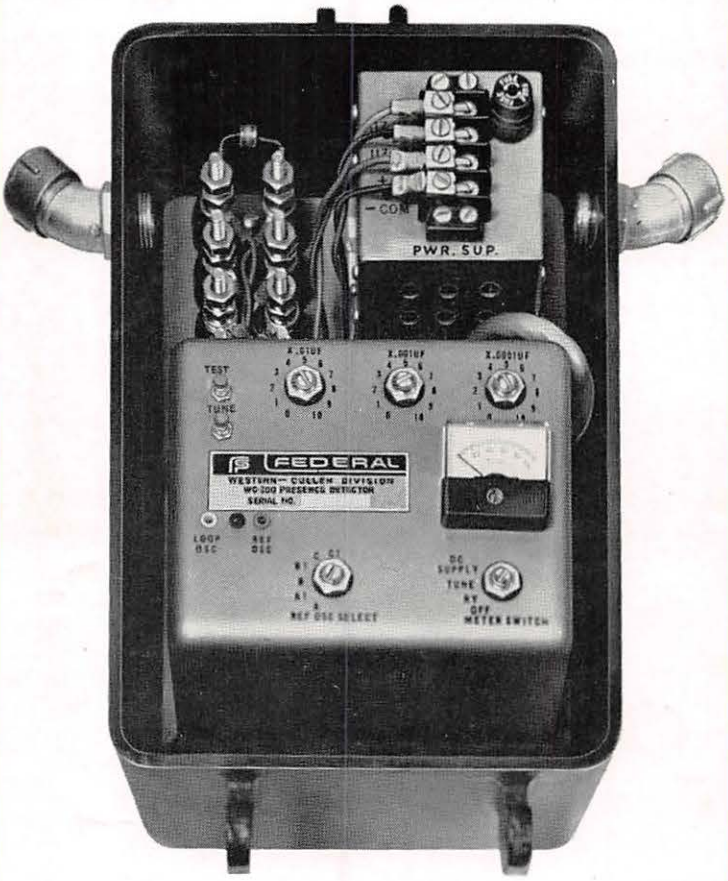

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